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# THE TEMPO OF SOVIET INDUSTRIAL EXPANSION

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## EDITORIAL NOTE

*This paper was delivered to the Manchester Statistical Society on January 9th, 1957. In view of the increasing interest in the subject matter of the paper, we are pleased to be able to take this opportunity of presenting Mr. Seton's important contribution to a rather wider public. We are grateful to the Manchester Statistical Society for permission to re-print.*

This paper is an attempt to estimate the rate at which Soviet industrial output has increased since the inception of full-scale planning in 1928. The subject is not a new one. It has exercised many minds ever since it was first realized that the official Soviet indices were likely to be more or less distorted, chiefly in an upward direction. There have been various attempts by Western scholars to eliminate this bias by reconstructing the indices *ab initio*, using such individual commodity series as were available in physical terms. Although these attempts were generally undertaken with the utmost care and great resourcefulness, we cannot, I believe, accept the findings with as much assurance as would seem desirable in international comparisons. I make no apology, therefore, for adding yet another estimate to an ever lengthening list, this time especially designed to circumvent those awkward problems of weighting procedure and product coverage which have cast such heavy shadows of doubt on similar estimates in the past.

It will be convenient to begin by restating the Soviet claims in the field of industry. This will be followed by a brief review of the criticisms levelled against them and of the alternative estimates advanced in the West. Finally, there will be a description of the author's own attempt to estimate industrial growth and a statement of the tentative results.

## The Soviet Claims

In the most recent Soviet statistical handbook—the first to be published for 17 years—we are given two industrial output series which could previously only be assembled from scattered references and with serious gaps. The first of these covers 'large-scale' industry which, broadly speaking, refers to establishments employing at least 16 production workers equipped with a prime mover, or at least 30 workers when not so equipped.[1] It is this series which until recently has been the stock-in-trade of Soviet industrial statistics. Side by side with it the Soviets occasionally publish an output series for ‘ all industry ’, which presumably covers all establishments classified as ‘ industrial ’,[2] whatever their size or departmental status. For convenience of reference we reproduce both series in Table I.

As might be expected, in all but a very few years ‘ large-scale ’ industry grew faster than industry as a whole. We have no means of knowing how much of the differential was due to the administrative promotion of small-scale establishments to ‘large-scale’ status in the wake of industrialization, and it is therefore better to concentrate on the more inclusive series when appraising Soviet claims against an international background. While it is possible, of course, that part of the spectacular growth of even the inclusive series was due to the statistical discovery of previously neglected production units, this can no longer be regarded as a source of bias exclusive to the Soviet Union.

TABLE I*

*Soviet Indices of Physical Output (1928 = 100)*

| *Year* | *Large-Scale Industry* | *All Industry* | *Year* | *Large-Scale Industry* | *All Industry* |
|---|---|---|---|---|---|
| 1928 ... | 100 | 100 | 1940 ... | 771 | 646 |
| 1929 ... | 125 | 120 | 1945 ... | 714 | 593 |
| 1930 ... | 164 | 146 | 1946 ... | 584 | 495 |
| 1931 ... | 202 | 176 | 1947 ... | 715 | 603 |
| 1932 ... | 232 | 202 | 1948 ... | 903 | 761 |
| 1933 ... | 251 | 213 | 1949 ... | 1,090 | 912 |
| 1934 ... | 301 | 254 | 1950 ... | 1,355 | 1,119 |
| 1935 ... | 370 | 312 | 1951 ... | 1,586 | 1,304 |
| 1936 ... | 482 | 401 | 1952 ... | 1,780 | 1,454 |
| 1937 ... | 537 | 446 | 1953 ... | 2,003 | 1,626 |
| 1938 ... | 599 | 498 | 1954 ... | 2,277 | 1,841 |
| 1939 ... | 691 | 578 | 1955 ... | 2,566 | 2,065 |

*Source: Ts. S.U. *Narodnoye khozyaystvo*, S.S.S.R., Moscow, 1956, pp. 45 and 46.

The peace-time period of the era falls easily into three parts:

1. The first flush of industrialization comprising the 8 years 1928–1936, with an average yearly growth rate of just under 20 per cent and a four-fold increase in the period as a whole.
2. The immediate pre-war period 1936–1940, with its much reduced yearly growth rate of 12½ per cent and an overall increase by 61 per cent.
3. The post-war period 1948–1955, with a claimed growth rate of slightly over 15 per cent per annum.

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[1] It covers, in addition, establishments under the jurisdiction of certain central departments (People's Commissariats, now ‘ Ministries ’) classified as ‘ industrial ’, regardless of their labour force or equipment. In certain minor industries special, and usually broader, definitions apply.

[2] In contrast to most Western definitions this extends to such activities as timber felling and floating, fisheries, and primary processing of agricultural produce on farms.

Periods 2 and 3 are separated by war and reconversion (1940–1948) by the end of which industrial production was claimed to have regained its former level and surpassed it by 18 per cent.

It is interesting to compare these claims with the achievements of other nations during their most spectacular periods of secular growth:

| *Soviet Union* | | | *Comparable expansion** | | |
|---|---|---|---|---|---|
| *Period* | *Claimed Growth-* | *in* | *Achieved in* | *by* | |
| 1. 1928–36 | 401% | 8 yrs. | 14 yrs. | South Africa | (1911–1925) |
| | | | 15 ,, | Japan | (1893–1908) |
| | | | 22 ,, | Sweden | (1873–1895) |
| | | | 38 ,, | the World | (1873–1911) |
| 2. 1936–40 | 161% | 4 yrs. | 5 yrs. | Sweden | (1895–1900) |
| | | | 7 ,, | Japan | (1906–1913) |
| | | | 9 ,, | South Africa | (1925–1934) |
| | | | 13 ,, | U.S.A. | (1882–1895) |
| | | | 15 ,, | the World | (1920–1935) |
| 3. 1948–55 | 271% | 7 yrs | 6 years.† | Japan & W. Germany | (1948–1954) |
| | | | 8 ,, | South Africa | (1911–1919) |
| | | | 17 ,, | U.S.A. | (1926–1943) |
| | | | 17 ,, | Canada | (1938–1955) |
| | | | 28 ,, | the World | (1870–1898) |
| 4. 1928–55 | 2065% | 27 yrs. | 38 yrs. | Japan | (1893–1931) |
| | | | 64 ,, | Sweden | (1870–1934) |
| | | | 70 ,, | Canada | (1870–1940) |
| | | | 90 ,, | the World | (1865–1955) |

*Manufacturing only. Sources: League of Nations, *Industrialization and Foreign Trade*, 1945, pp. 130, *et. seq.*, U.S. Bureau of the Census, *Historical Statistics of the United States*, and Supplement, O.E.E.C., *Industrial Statistics* 1900–1955, Paris, 1955, p. 6, U.N.O. *Statistical Year Book*, 1955, p. 116, *et seq.*

†Japan and West Germany had not, however, fully exhausted the potentialities of reconstruction by the beginning of the period quoted.

## THE NATURE OF THE SOVIET INDEX

Most of the Western volume indices take their starting point from a set of physical commodity series collected and sifted by the same authority which subsequently compounds them into a single index. In the Soviet Union the Central Statistical Administration does not operate directly on the original commodity series in this manner. Instead, it orders each enterprise[1] to value its annual output in the constant prices of a fixed base year (as listed in centrally issued price books), and limits its own contribution to the mere summation of the reported figures. This fits in well with the requirements of physical output planning and performance control on the enterprise level which is, after all, the primary function of the Soviet statistical system from which overall measures of growth are only allowed to emerge as by-products. The time series of industrial output yielded by this simple summation procedure is a ‘ gross-value ’ index, *i.e.* a compound of growth rates of individual commodities, each weighted by its full *price* (in the base year), rather than by its *value-added* (wage + profit per unit), as is customary in constructing the ‘ net-value ’ indices of the West. It has therefore been subjected to criticism on two counts:

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[1] An ' enterprise ' is officially defined as a complex of operations with a separate accounting system. The delimitation may therefore depend on administrative convenience as much as on technological compactness, though of course the two criteria are bound to be closely related in practice.

In so far as industrialization will boost the output of ‘ material-intensive ’ industries (engineering, chemicals, etc.) more than that of ‘ factor-intensive ’ branches (mining, basic metals, etc.), a system of *price* weights—which includes material costs—is bound to give much greater prominence to the fastest-growing components of the index than would result from *value-added* weights (which exclude material costs). The ‘ gross-value ’ Soviet index should therefore contain an upward bias compared with the ‘ net-value ’ Western indices.

The argument which led to this conclusion has certainly considerable force when applied to *Western* defectors from the ‘ net-value ’ principle (*e.g.* Finland, Mexico and others). But I believe it should be used with caution in the Soviet case, where a wholly untypical laggardness of consumer industries has been one of the outstanding characteristics of industrialization. As most of these, particularly the textile industry and food processing, are even more ‘ material-intensive ’ than engineering and chemicals, it would appear that in replacing value-added by gross-value weights the Soviets were giving undue emphasis not merely to the *fastest*-growing, but also to some of the *slowest*-growing of their industries. It is far from certain, therefore, that the net outcome must necessarily be an exaggeration of overall growth, and perfectly conceivable that a switch to value-added weighting would *inflate* rather than *deflate* the Soviet index if all its other characteristics were preserved.[1]

The second effect of gross-value weighting has sometimes been confused with the first, although the two are quite distinct. In adding up the gross output of all enterprises, the value of intermediate products is counted repeatedly whenever they reappear as material cost items in successive stages of processing. This ‘ double counting ’ is of course avoided by giving each commodity its *net* value, purged of all material costs. It is clear, therefore, that the Soviet procedure must yield an inflated figure for the absolute volume of output in any given year, the inflationary bias being *greater* the *lower* the degree of vertical integration in industry, *i.e.* the larger the number of inter-related plant endowed with a separate identity for the purpose of statistical reporting. It does not follow, however, that the growth-rate of output from one year to the next need also suffer inflation, unless the degree of vertical integration should have decreased. Now while it is quite easy to identify short periods in Soviet history in which the *technological* tendency was consistently towards integration, or away from it, we have no notion to what extent accounting procedure, and hence the statistician's units of observation, were affected in the same direction, and I therefore think we should be well advised to suspend judgment on the bias of gross-value weighting on this count also. I would, however, exempt the most recent period from this self-denying ordinance; for in the present decade the principle of increasing ' specialization and co-operation ' among industrial enterprises has been proclaimed a major guideline of economic policy. Specialized workshops, such as foundries, forges, and the like, which were previously sub-departments of large integrated production units are increasingly detached from the parent body, set up as independent enterprises, and expanded into regional suppliers for a number of previously self-supporting establishments. Moreover, enterprises producing large assortments of products are coaxed and prodded into greater specialization, both horizontal and vertical, and there can be little doubt that the inter-plant turnover of materials and sub-assemblies must have greatly increased in recent years. I think it highly likely therefore that the Soviet index acquired a new or increased upward bias due to ' double-counting ' after 1950 or thereabouts.[1]

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[1] In a subject so controversial as this it is important to state one's fundamental beliefs at every point where particular arguments may seem to contradict them. I think it highly probable that the Soviet index has a substantial upward bias, as will appear shortly, but I do not believe that this is necessarily so because of its gross-value character.

The third criticism often levelled against the Soviet index, concerns the particular weight-base used and has no direct connection with gross-value weighting as such. Up to 1950 the fixed price structure underlying the index was that of the fiscal year 1926–7 which is remote in time and untypical in character in relation to the bulk of the period. At a time when industrial development is as rudimentary as it must have been in the mid-'twenties, the scarcity of ' advanced ' goods, like steel, chemicals, machinery, etc., will cause their prices to be much higher in relation to other commodities than they would normally be during or after periods of rapid industrialization, when these products had become more plentiful. But since it is precisely these goods which scored the highest growth rates in the subsequent quarter of a century, the 1926–27 weight-base may be expected to yield a higher overall index than would have emerged if post-industrialization or mid-industrialization prices had been used.

This argument would certainly be valid if we could rely on prices to move in response to scarcity and efficiency in the direction in which we should normally expect them to move. It is, however, far from certain that this happened in the Soviet Union, where the price system depends in the main on planning decisions. There were long periods in the middle and towards the end of the industrialization drive when the Soviet prices of 'advanced' goods were kept artificially low by subsidies or low profit margins; there were others when the removal of subsidies resulted in sudden price inflation in the advanced sectors. Even if the Soviet price structure were known for every year since 1928, which is far from being the case, it would be very hard to pick on any single year or period which could be unequivocally designated ' mid-industrial ' or ' post-industrial ' as far as the price structure was concerned. None the less it remains true that the employment of 1926–7-weights must have given the Soviet index an upward bias compared with what would have resulted from the use of prices ruling in another *country* at a more advanced stage of development. Unfortunately the transplantation of price systems across national frontiers into a completely altered context of scarcity relationships is apt to raise more problems than it solves. All we can say at this stage is that the Soviet index must be suspected of *some* upward bias due to the early-period weighting used.

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[1] This view does not accord with that expressed by Professor Gerschenkron in *The American Statistician*, June–July, 1953.

This does not, however, apply to the period covered by the last Five-Year Plan, when the weight-base of the index had been shifted from 1926–7 to 1952. In February 1952, each enterprise was ordered to revalue the output of the two previous years (1950 and 1951) in terms of the new prices introduced on January 1st, 1952, and henceforth these prices were to be the only measuring rod for the physical volume of output. To obtain continuous output series extending back to the 'twenties, the 1952-weighted index was in every case mechanically linked with the 1926–7-weighted index at the point of contiguity, *i.e.* in 1950, when both valuations of output were available. At the end of last year there was a renewed shift in the weightbase, this time to the prices of July 1st, 1955—the output of the pivotal year 1955 being again computed on the enterprise level in both 1952– and 1955–prices for the purpose of linking future with past indices. It appears then, that the Soviets have at last recognized the error of using obsolete prices, and will henceforth shift the base-year for index-weighting to the beginning of each new quinquennium. To that extent, and to that extent only, the output index after 1950 may be expected to have a reduced inflationary bias compared with that which went before.

The fourth, and probably most damaging, criticism of the Soviet index concerns the treatment of ' new goods ', *i.e.* of those products which were not yet in production in the year of the price base and therefore had to be given imputed ' constant ' prices. Soviet practice in this respect has not remained uniform in our period. At one time the ' new goods ', whose output may have grown at anything from five to fifty times the normal rate, were allowed to enter the index at the prices of their first years of large-scale production. It is clear that this valuation must have been much higher than any reasonable analogy with the 1926–7 price level would have warranted, both because it was affected by the general price inflation of the intervening years, and because initial difficulties in the first year of production must have raised the cost above the normal level. The resulting over-weighting of these 'spearheads of industrialization ' must be an important source of upward bias in the index. Against this it should be allowed that the procedure for valuing ' new ' goods was later revised and some deflation towards the true 1926–7 level provided for; but Soviet authors admit that this did not go nearly far enough, and we must conclude that a substantial upward bias persisted, at least until the price-base changed in 1950.

What happened after that? The period since 1949 has been one of falling prices. A new good making its appearance, say, in 1954 might therefore be expected to be *lower*-priced than similar commodities in 1952 (the weight-base of the index), if it were not for the higher initial production cost associated with its newness. When this offsetting factor is taken into account, we might conclude that the 1954 price as it stands was on balance the most appropriate valuation one could hope for. But since 1952 the Soviets no longer allow the ' first-year pricing ' of new goods. Instead each enterprise is ordered to *inflate* these prices in proportion to the fall in its general price level since January 1st, 1952.[1] It follows that the price differential due to initial inefficiency is fully preserved and new goods still receive an undue emphasis within the index. We must assume, therefore, that at least a portion of the traditional upward bias of the Soviet index has survived the recent modernization of its weight-base.

So far we have lighted on two reasons for dissenting from the widespread belief that the Soviet index after 1950 must be less inflated than its predecessor: the increasing ' double-counting ' in a period of progressive vertical disintegration, and the treatment of new goods after 1952. A third reason is the recent departure from the practice of using *single* price-weights for a given good, regardless of its geographic origin. Since 1952 (or earlier?) it appears that zonal prices have been used by every enterprise.[2] This must surely boost the total index with every shift in the locational pattern of industry towards the more expensive under-developed zones of the country. We know that these shifts have been greatly accelerated in recent years, and though the resulting inflation of the index may be partially justified on theoretical grounds, it will certainly tend to vitiate comparisons with Western indices which are based on the uniform pricing of commodities. This may be reinforced still further by the administrative decentralization of the last few years, when a large number of enterprises were transferred from central or Republican to local jurisdiction. Since district enterprises must frank their prices *free on rail* at the station of *destination*, this may have resulted in an automatic raising of more and more prices through the incorporation of previously excluded transport costs. It is impossible to gauge the extent of the inflationary bias introduced by these factors. It may well be small for each of them in isolation, but the cumulative effect is bound to tell.

In the light of the foregoing arguments, I should be inclined to discount *some* of the accusations levelled against the Soviet index in the pre-war period, though I believe the gravamen of the charges to be valid. On the other hand I would dissociate myself from the view that the post-war index was substantially more reliable as a standard of comparison in the West.

## WESTERN ESTIMATES

In the face of the justified suspicion with which the Soviet index has generally been regarded, much of the energy of Western scholars has had to be diverted from the all-important study of the causes and effects of Soviet industrial expansion to a painstaking reappraisal of its actual speed and extent. Several independent estimates have appeared in recent years, the most important of which are well described in Professor Hodgman's book.[1] I do not propose to repeat or supplement his analysis here beyond recalling that all these estimates are based on the compilation of as many individual commodity series as possible and their subsequent aggregation by means of certain chosen weights.[2] In consequence, their reliability must heavily depend on:

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[1] See *e.g.* N. Lyubimov in *Vestnik Statistiki*, 1955, No. 4, p. 29.

[2] *Ibid.*, pp. 27–28.

1. The completeness of the product coverage achieved.
2. The ' representativeness ' of the chosen series (given that only incomplete coverage is possible), and
3. The appropriateness of the weighting procedure.

None of these can be gauged with any certainty.

Professor Gerschenkron's index of machinery output, for instance, which must surely be among the most comprehensive and judicious compilations which the West is likely to achieve, can hardly claim a coverage of more than 35 per cent in the pre-war period.[3] Moreover, as Professor Gerschenkron himself points out, the behaviour of an American analogue of the same coverage deviates quite markedly from the comprehensive U.S. machinery index whose movements it is meant to reproduce.[4] Lastly, the weighting procedure (American prices of 1939) is equally questionable, both in its theoretical implications and practical effects.

Professor Hodgman's index of the output of ' large-scale ' industry,[5] which is the other Western estimate of comparable standard, suffers from similar defects. Its coverage appears at first sight to extend to 70 per cent of the industrial labour force.[6] But this result derives from the summation of the total number of workers in all the *branches* which figure in the index, without allowance for the defective coverage of *products* within each branch. If this were taken into account the *commodity*-coverage of the index might well be found to fall substantially below 50 per cent. Unfortunately there is no way of testing the ' representativeness ' of the products covered, as no Western analogue of similar coverage has so far been constructed. The weighting procedure adopted by Professor Hodgman is probably the most satisfactory part of his index, but even this has been impugned more recently.[7]

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[1] Donald R. Hodgman, *Soviet Industrial Production, 1928–1951*, Cambridge, 1954, Chapter 6.

[2] In the case of Mr. Jasny's estimates (*The Soviet Economy during the Plan Era*, Stamford, 1951) this procedure applies to the construction of price deflators and not directly to the output indices.

[3] Computed by analogy with the American industry; see A. Gerschenkron, *A Dollar Index of Soviet Machinery Output, 1927–8—1937*. The RAND Corporation, Santa Monica, 1951, p. 38. The coverage achieved in relation to the *Soviet* industry may well be larger, but there is no way of ascertaining this.

[4] *Ibid.*, p. 38.

[5] Donald R. Hodgman, *op. cit.*

[6] Large-scale industry only, exclusive of Timber Felling and Floating; see Donald R. Hodgman, *op. cit.*, p. 56.

[7] Peter Wiles, 'Are Adjusted Rubles Rational? ' in *Soviet Studies*, October, 1955, p. 143, *et seq*.

Other indices which have gained a measure of acceptance in the West are based on even more selective series of commodities, and their authors only partially disclose the underlying procedure of weighting.

In the light of this experience it does not seem superfluous to make a renewed attempt to estimate the growth of Soviet industry.

## An Alternative Estimate

For the Western observer looking at the Soviet economy from the other side of a very thick curtain, the attempt to estimate industrial growth by accounting separately for each of its innumerable components and then selecting some more or less arbitrary method of aggregating them into a single index, encounters so many obstacles, conceptual and practical, that whatever degree of success it may eventually achieve—and this is always problematic—can hardly be commensurate with the effort involved. It is not surprising, therefore, that from time to time various short-cuts have been suggested. Essentially they took the form of selecting a single economic indicator, such as the output of a basic homogeneous product, or a very small number of them, and tentatively accepting their rate of advance as approximations to the growth of industry as a whole. Among the most suitable indicators suggested in this way were the total consumption of minerals (valued at fixed U.S. prices) and the freight turnover of railways in ton-kilometres. Both of them reproduce the trend of industrial output quite faithfully in the United States. There is some doubt, however, whether this alone can justify the assumption that they would also do so in the Soviet Union; for here the degree of the ' mineral intensity ' of industrial output may have changed in quite a different way from year to year, and the locational pattern of industry, on which both volume and average distance of freight traffic heavily depend, may well have varied in response to factors other than the volume of industrial output. Some years ago Mr. Dobb suggested the use of four basic output series, those of coal, oil, pig iron, and steel, whose growth rates were to be combined into a single index by arithmetic averaging (without weights). There is probably more to be said for some such procedure than may appear at first sight, but in this particular instance it is quite easily ascertained that the relation in which Mr. Dobb's index stands to the growth of industrial production has varied enormously, and unpredictably, from country to country and period to period, and there can be no presumption that it will either run parallel to, exceed, or fall short of, the overall rate of industrial growth in Soviet Russia. I should therefore be inclined to accept these methods as fruitful suggestions of a general approach of considerable promise rather than as definitive estimates, and I must add in fairness that their authors would probably not claim for them much more than that.

My own experiment is a simple development of the idea they have put forward. I started from a hypothetical situation in which access to the statistics of Western countries was presumed to be restricted to the same selective output series to which the Soviets had rationed us for such prolonged periods in the past. If, in such a situation, we wished to estimate the growth of total manufacturing in these countries, we should have to cast about for a method of combining the least ambiguous and most 'representative' of the known statistics in a suitable formula of some sort, just as Western scholars have attempted to do in the case of the Soviet Union. Obviously some of these formulae would be better than others, and if we now assume that the official growth rates of total manufacturing were made available again, they could be used to identify that formula which gives the nearest approximation to the truth in the greatest number of countries. We could then apply this formula to the published statistics of the Soviet Union, in the knowledge that by estimating Soviet industrial growth in this manner we should have made the fullest use of all the relevant experience available in the West; in other words, we should have done the best we could within the bounds of our information. Technically speaking, what we are looking for is the multiple regression equation of the growth rate of manufacturing on the growth rates of two or three of those basic series which are the stock-in-trade of official Soviet publications.

*The variates*

The required equation will be of the form:

$$z = Au + Bv + Cw + D \tag{1}$$

where $z$ is our estimate of the growth rate of manufacturing, and $u$, $v$, and $w$ are the growth rates of the basic products or inputs selected as 'estimators'. If the corresponding capital letters stand for the *absolute* outputs (or inputs) from which these growth rates are derived the following relations will hold good:

$$z = \frac{dZ}{dt} \cdot \frac{1}{Z}, \quad u = \frac{dU}{dt} \cdot \frac{1}{U}, \text{ etc.,} \tag{2}$$

where $t$ stands for time, and equation (1) may be written in a manner reminiscent of the Cobb-Douglas functions:

$$Z = kU^A V^B W^C e^{Dt} \tag{3}$$

As a matter of practical arithmetic, the variates of equation (1) are the *average yearly growth rates* observed between two fixed selected years in which the relevant absolute figures happened to be available.

After some experimenting it was found that a good approximation to the true manufacturing growth could be obtained with as few as three 'estimator' variates, provided these were chosen as follows:

$u \equiv$ growth rate of total consumption of fuel and hydro-electric power in terms of calories.

$v \equiv$ growth rate of steel consumption.

$w \equiv$ growth rate of electricity consumption.

Naturally our choice of estimators was severely limited by the availability of statistics. It was further limited by certain self-imposed restrictions. Chief among these was the decision to use *input-* rather than *output*-series.

For in this way the regression equation becomes a summary of *technological* conditions, such as might be assumed to hold universally, while the choice of *output* series would have given it much more the character of a statement on the complementarity of certain demands, which could not be extrapolated from the West to Soviet conditions with the same degree of confidence.

It was furthermore desirable that the inputs chosen should be as widely used as possible without losing some underlying physical homogeneity. Thus, where in the interests of this general ' pervasiveness ', they had to comprise heterogeneous components (such as coal, oil, gas, etc. within fuel consumption), these had to be commensurable in natural terms (*e.g.* calories) *without the use of prices.* For if prices were involved at any stage of the computation, we should be readmitting just those doubts and difficulties concerning appropriate valuation or weighting systems which our method was designed to circumvent. This rules out such eminently desirable estimators as mineral consumption or total input of primary metals.

As the dependent variable which is to be estimated we have chosen *manufacturing* production rather than total industrial output, in order to eliminate the mining component and electricity generation which might merely reproduce the movements of fuel and electricity consumption, thus injecting an avoidable element of spurious correlation into the estimating equation.

### *The periods of observation*

We have selected three periods of unequal length for observation, chiefly because their terminal years are particularly well documented in international statistics:

| | |
|---|---|
| Period I. | 1929–1937 |
| Period II. | 1937–1950 |
| Period III. | 1950–1953 |

Regression equations of form (1) were computed separately for each of these periods. To avoid the distorting effect of fortuitous peaks or troughs in any of our series during a terminal year, we have based the average growth rates on three-year moving averages throughout. Thus, the yearly growth rate of steel consumption between 1929 and 1937 is derived from the ratio of average consumption of the years 1936–8 to that of 1928–30. The same applies to all other variates and periods.

### *The units of observation*

For each of the three periods a set of four growth rates (manufacturing, fuel input, steel consumption and electricity consumption) was compiled for as many countries as were found to have published the required data. The necessity of obtaining comparable statistics for all four of the variates for at least six years (in order to compile the terminal three-year averages of any period) severely limited the number of countries that could be covered in the experiment. For period I this number was only 14, and for periods II and III it had to be further reduced to 10. A small number of countries for whom the required information would have been available had to be rejected because their standards of statistical reporting were thought to differ too much from the general norm, or because of certain features in their development during the period in questions which would have meant the addition of obvious freaks.

The statistical population which could thus be assembled for our tetravariate regression analysis is exceedingly small, which unhappily rules out the tests of significance one would normally wish to make upon the (multiple) correlation coefficient. This is of course the greatest weakness of our method in the limited form in which it could be applied at the present time. The experiment is not, however, intended as anything more than a preliminary reconnaissance into a field of estimating procedures which may well offer greatly improved results in the future when statistics may be more plentiful and reliable.

To test our method upon a somewhat larger population we have computed, in addition to the formulae for periods I, II, and III, a further equation which optimizes the regression for all countries and all periods under review. The statistical population underlying this analysis consists of 34 observations in which most countries are represented more than once, reappearing separately at each stage of their development (periods I, II, and III). This diversification of the periods will of course result in some loss of homogeneity in the data. On the other hand, the fourth regression equation, when applied to Soviet data, will no longer commit us to the assumption that the technological conditions during any given sub-period of Russia's belated industrialization drive were of necessity the parallels of Western conditions during exactly the same period of time. As will be seen shortly, the estimate of Soviet manufacturing growth suggested by the fourth regression equation does not greatly differ from that which results from the successive application of the first three in each of the appropriate periods.

*The findings in the West*

Table II reproduces the basic data from which our calculations started. No further comment is needed here, except that the doubtful comparability of pre-war with post-war data might have made the carrying of a second decimal in period II undesirable as a spurious suggestion of accuracy.

The three regression equations derived from this data are as follows (multiple correlation coefficients and error variances are indicated in brackets):

I. 1929–1937:

$$z = 0.338\,u + 0.325\,v + 0.234\,w - 0.082 \begin{pmatrix} R = 0.931 \\ \sigma^2 = 0.666 \end{pmatrix}$$

II. 1950–1950:

$$z = 0.333\,u + 0.433\,v + 0.474\,w - 1.455 \begin{pmatrix} R = 0.983 \\ \sigma^2 = 0.092 \end{pmatrix}$$

III. 1950–1953:

$$z = \qquad\qquad 0.415\,v + 0.706\,w - 2.964 \begin{pmatrix} R = 0.955 \\ \sigma^2 = 0.899 \end{pmatrix}$$

TABLE II.—*Average Yearly Growth Rates (per cent)*

| | *I. 1929–1937* [a] | | | | *II. 1937–1950* [a] | | | | *III. 1950–1953* [a] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Manufacturing* [b] $z'$ | *Fuel consumption* [c] $u$ | *Steel consumption* [d] $v$ | *Elec. consumption* [e] $w$ | *Manufacturing* [b] $z'$ | *Fuel consumption* [c] $u$ | *Steel consumption* [f] $v$ | *Elec. consumption* [e] $w$ | *Manufacturing* [b] $z'$ | *Fuel consumption* [c] $u$ | *Steel consumption* [f] $v$ | *Elec. consumption* [g] $w$ |
| Austria ... | −1.42 | −2.81 | −4.64 | 1.73 | — | — | — | — | — | — | — | — |
| Belgium and Luxemburg | 0.25 | −1.29 | −1.56 | 3.31 | 1.4 | 0.0 | 2.2 | 3.8 | 3.11 | 0.83 | 4.65 | 5.79 |
| Denmark ... | 3.77 | 2.80 | 0.90 | 8.22 | — | — | — | — | 0.89 | 4.65 | −1.97 | 7.84 |
| France... ... | −1.78 | −0.96 | −3.45 | 3.02 | 1.3 | 0.7 | 2.8 | 4.2 | 3.82 | 2.53 | 6.53 | 7.58 |
| Germany [h] ... | 2.99 | 2.04 | 6.90 | 5.99 | — | — | — | — | 12.93 | 6.53 | 15.65 | 11.39 |
| Greece ... | 3.69 | 4.62 | −1.01 | 11.21 | — | — | — | — | — | — | — | — |
| Ireland ... | 4.01 | 1.37 | 0.53 | 13.83 | 3.4 | 0.6 | 1.1 | 8.6 | — | — | — | — |
| Italy ... ... | 1.08 | 3.82 | −0.28 | 4.76 | 1.9 | 0.8 | 1.8 | 4.0 | 8.80 | 10.22 | 1.543 | 9.55 |
| Netherlands | −0.33 | 0.78 | −1.00 | 5.33 | 3.4 | 2.1 | 2.9 | 5.8 | 8.80 | 3.48 | 5.61 | 9.55 |
| Norway ... | 3.06 | 1.55 | 3.28 | 1.84 | 4.2 | 3.5 | 5.5 | 4.8 | 4.65 | 5.22 | 4.43 | 5.88 |
| Sweden ... | 5.50 | 5.44 | 4.09 | 6.28 | 4.0 | 3.3 | 3.6 | 6.5 | — | — | — | — |
| United Kingdom ... | 4.12 | 1.00 | 5.23 | 8.22 | 2.7 | 1.0 | 2.5 | 5.5 | 2.76 | 1.58 | 3.29 | 6.12 |
| Canada ... | 0.42 | 1.00 | −4.29 | 5.42 | 6.4 | 4.7 | 8.0 | 5.3 | 3.38 | 3.97 | 1.70 | 8.07 |
| United States... | 0.04 | −0.29 | −1.85 | 2.84 | 5.8 | 3.4 | 5.5 | 8.1 | 4.95 | 3.04 | 1.45 | 9.25 |

[a] The true boundaries of the periods are the three-year averages: Av. 1928–30, Av. 1936–8, Av. 1949–51, and Av. 1952–4.

[b] Computed from O.E.E.C. *Industrial Statistics*, 1900–1955, Paris, 1955, p. 6.

[c] Includes consumption of hydro-electric power. Computed from *ibid.*, p. 26. In the pre-war period the source gives only the figures for the *calendar* years 1929 and 1937. These were converted to estimates of the corresponding three-year averages by the use of coefficients derived from P. C. Putnam, *Energy in the Future*, London, 1954, pp. 334–5, 342–5, 364, 374–9, and 441–2. Countries for whom no such coefficients could be derived were treated by analogy with others in their geographical area: Austria and Italy like Germany, Belgium and Luxemburg like France, Canada like the United States, and the Scandinavian countries, Netherlands, and Ireland like the United Kingdom.

[d] Computed from U.N., E.C.E., *Growth and Stagnation in the European Economy*, Geneva, 1954, pp. 278–9. Figures for the U.S.A. from *ibid.*, p. 229, and for Canada from U.N. *European Steel Exports and Steel Demand in Non-European Countries*, Geneva, 1953, p. 15.

[e] Growth rates assumed identical with those of electricity *production*. The latter were computed from O.E.E.C., *op. cit.*, p. 53.

[f] Computed from O.E.E.C., *op. cit.*, p. 65. Post-war figures for Greece and Ireland are from U.N. *Statistical Year-book*, 1955, p. 308 and 1954, p. 283.

[g] Computed from production figures (O.E.E.C., *op. cit.*, p. 65) after deducting net export (*ibid.*, p. 56).

[h] After 1950 West Germany only.

It is interesting to note that the contribution which the fuel component $u$ is able to make to the explanation of manufacturing growth decreases slightly from period I to period II, and disappears altogether in period III. In fact, after 1950 the movements in fuel consumption have become so closely linked with those of steel and electricity consumption that a knowledge of the latter is sufficient to provide practically all the information on the growth of manufacturing we could hope for, and the additional statement of the growth in fuel consumption would merely repeat what we already know.

The fourth regression equation which embraces all 3 periods and 14 countries of Table II, shows features intermediate between the first 3 formulae:

IV. 1929–1953:

$$z = 0.168\,u + 0.415\,v + 0.314\,w - 0.330 \begin{pmatrix} R = 0.946 \\ \sigma^2 = 0.831 \end{pmatrix}$$

A convenient graphical summary of the four regressions is presented in the form of the Tinbergen charts[1] A1 and A2 (Appendix). Here the growth rate of manufacuring ($z'$) as derived from the official data of each country is analysed into four components: the separate ' influence ' of each of the three estimators (corresponding to the terms $Au$, $Bv$, and $Cw$ of the regression equation), and a residual term which is the sum of the regression constant $D$ and the error of estimation ($z'-z$). The countries are arranged in descending order of the latter.

Table III conveys some idea of the ' closeness of fit ' achieved by the regression equations of the three separate periods.

### *The Soviet Data*

As explained previously, our estimator-variates have been chosen with an eye to Soviet statistics, where official data on fuels, steel, and electric power have always been among the most plentiful and self-consistent. Hence there is no particular difficulty in assembling them in the form in which they fit into the regression equations. Unfortunately, however, the original figures given in Soviet sources almost invariably refer to *production*, and the corresponding consumption figures have had to be derived by the addition of net imports (or subtraction of net exports). The result is, of course, *apparent* consumption only, and does not take account of movements in stocks. But the same weakness is inherent in practically all Western data, and while it may distort the growth rates of *particular* years, there is no reason to suppose that it will seriously affect the average growth rates over longer periods of time.

A more serious defect in the estimates is due to the absence of Soviet foreign trade data for individual commodities in all years after 1938. These have had to be taken from Western estimates, or simply guessed. In some

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[1] Tinbergen, *Statistical Testing of Business-cycle Theories*, Geneva, 1939, p. 26. Similar charts were used by I. Svennilson in *Growth and Stagnation in the European Economy*, Geneva, 1954, p. 225.

TABLE III

*Official and Estimated Yearly Growth Rates in Manufacturing (per cent)*

| | I *1929–1937 a* | | | II *1937–1950 a* | | | III *1950–1953 a* | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Manufacturing* | | *Discrep-Official* | *Manufacturing turing* | | *Discrepancy* | *Manufacturing* | | *Discrepancy* |
| | *Official b* | *Estim'd c* | | *Official b* | *Est'd. c* | | *Official b* | *Estim'd c* | |
| Austria ... | −1.42 | −2.14 | 0.72 | — | — | — | — | — | — |
| Belgium and Luxemburg | 0.25 | −0.25 | 0.50 | 1.4 | 1.3 | −0.1 | 3.11 | 3.06 | 0.05 |
| Denmark ... | 3.77 | 3.08 | 0.69 | — | — | — | 0.89 | 1.75 | −0.86 |
| France ... | −1.78 | −0.82 | −0.96 | 1.3 | 2.0 | −0.7 | 3.82 | 4.10 | −1.28 |
| Germany *d* | 2.99 | 4.25 | −1.26 | — | — | — | 12.93 | 11.58 | 1.35 |
| Greece ... | 3.69 | 3.77 | −0.08 | — | — | — | — | — | — |
| Ireland ... | 4.01 | 3.79 | 0.22 | 3.4 | 3.3 | 0.1 | — | — | — |
| Italy ... | 1.08 | 2.23 | −1.15 | 1.9 | 1.5 | 0.4 | 8.80 | 10.21 | −1.41 |
| Netherlands | −0.33 | 1.10 | −1.43 | 3.4 | 3.2 | 0.2 | 5.88 | 6.11 | −0.23 |
| Norway ... | 3.06 | 1.94 | 1.12 | 4.2 | 4.4 | −0.2 | 4.65 | 3.03 | 1.62 |
| Sweden ... | 5.50 | 4.55 | 0.95 | 4.0 | 4.3 | −0.3 | — | — | — |
| United Kingdom | 4.12 | 3.88 | 0.24 | 2.7 | 2.6 | 0.1 | 2.76 | 2.72 | 0.04 |
| Canada ... | 0.42 | 0.13 | 0.29 | 6.4 | 6.1 | 0.3 | 3.38 | 3.44 | −0.06 |
| U.S.A. ... | 0.04 | −0.12 | 0.16 | 5.8 | 5.9 | −0.1 | 4.95 | 4.17 | 0.78 |
| Total Avge. | 1.81 | 1.81 | 0.00 | 3.45 | 3.46 | −0.01 | 5.12 | 5.12 | 0.00 |

*a* The true boundaries of the periods are the three-year averages: Av. 1928–30, Av. 1936–8, Av. 1949–51, and Av. 1952–4.
*b* For sources, see Table II, footnote *b*.
*c* Computed from columns *u*, *v*, and *w* of Table II, according to formual I, II and III (for each period respectively). *d* After 1950 West Germany only.

cases, where even this presented too many difficulties, we have had to make do with the original production data as they stood, without attempting to convert them into consumption figures. It is not thought, however, that this will affect our final estimate of manufacturing growth as seriously as may appear at first sight. Foreign trade still plays a very subordinate role in the Soviet economy, and those commodities whose consumption levels may be more strongly affected by it (coal and oil) enter only into the *fuel*-component of the regression which exerts comparatively little influence on the final estimates (see Chart A 1, periods II and III, and Chart A 2).

The inclusion of peat in ‘ mineral ’ fuels is dictated by the relative importance of this fuel in the Soviet economy. Peat as a source of energy is practically negligible in all but one or two Western countries, and its omission from the Western data is therefore quite legitimate. But it has some fairly important applications in Soviet industry, and cannot therefore be neglected without the risk of some distortion in the overall trend of fuel consumption.

As regards Soviet steel consumption in the post-war period, we are fortunate in having estimates by the Economic Commission for Europe based on official Soviet output data, and on the export and import statistics of all important countries trading with the Soviet Union. The consumption of electric power in the Soviet Union can be taken to equal its *production* with hardly any risk of error.

Complete series of the three input-variates and the components from which they were derived are given in Table A 1 (Appendix).

### *An index of Soviet manufacturing*

Soviet growth rates of fuel input, steel consumption and electricity consumption for the three sub-periods and for the plan era as a whole can be derived from Table A 1, and are reproduced for ease of reference in the first three columns of Table IV. It is then an easy matter to derive estimates for the growth of manufacturing by applying our four regression equations to them.

As may be seen from the table, our estimates are well below the officially claimed growth rates for total industrial production. The upward bias in the Soviet index suggested by them varies greatly from one period to the next, rising from a mere 13 per cent p.a. in 1928–37 to as much as 40 per cent p.a. during 1937–50, and subsequently falling back to about 22 per cent p.a. in the 'fifties to date. Even the upper limits of our estimates fall noticeably short of official claims. Moreover, it must not be forgotten that the figures most frequently quoted in Soviet sources and repeated in the West are those referring to *large-scale* industry rather than to industry as a whole. This is particularly so in references to the earliest period (1928–37), during which the excess of the former over the latter was greatest. Measured against the official index of large-scale industry, our estimates imply an upward bias of nearly 31 per cent p.a. in the first period, 40 per cent in the second, and about 27 per cent in the period after 1950. Yet they are somewhat nearer the official claims than Professor Hodgman's revised index[1] which implies an inflationary bias of as much as 33 per cent and 66 per cent in the first two periods respectively. This does not, however, fully indicate the gap, which separates Professor Hodgman's estimates from our own, particularly during the earliest period under review; for Hodgman's index is intended to cover *large-scale* industry only,[2] and he leaves us in no doubt concerning his belief that an extension of the coverage to the *whole* of industry would reduce his estimate rather than increase it. If this reduction were proportional to that which the official index undergoes in a similar extension of the coverage (*i.e.* by 13.4 per cent) the Hodgman index would imply a growth rate of only 13.6 per cent p.a. in the earliest period, and thus fall short of our estimate by fully 15 per cent. The shortfall in the second period is practically the same (15.4 per cent.). Whether or not this hypothetical reduction is legitimate, there seems to be no doubt that the verdict on Soviet industrial expansion which emerges from our experiment is noticeably more favourable than Professor Hodgman's diagnosis, though it is still much closer to it than to the staggering official claims.

Chart 1 gives an illustration of the manner in which our estimates have

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[1] Donald R. Hodgman, *Soviet Industrial Production, 1928–51*, Harvard University Press, Cambridge, 1954.

[2] There is some doubt whether this has in fact been achieved. See F. Seton, 'An Estimate of Soviet Industrial Expansion,' in *Soviet Studies*, Oct., 1955.

TABLE IV

*Estimates of Soviet Manufacturing Growth Compared with Direct Data on Industrial Production**

| | *Growth in consumption a* | | | *Regression estimates of of manuf. growth* | | *Official Indices d* | | *Hodgman's index for large-scale Industry e* |
|---|---|---|---|---|---|---|---|---|
| | *Fuel and Water Power u* | *Steel v* | *Electricity w* | *b z* | *c Limits* | *All industry* | *large-scale indus.* | |
| Average Yearly R. of G. (%): | | | | | | | | |
| I. 1928–37 ... | 14.7 | 16.3 | 24.6 | 16.0 | 14.5–17.1 | 18.1 | 20.9 | 15.7 |
| II. 1937–50 ... | 5.2 | 3.4 | 7.4 | 5.2 | 4.5– 5.6 | 7.3 | 7.3 | 4.4 |
| III. 1950–55 ... | 9.4 | 10.2 | 13.3 | 10.7 | 9.4–12.0 | 13.1 | 13.6 | — |
| IV. 1928–55 ... | 9.1 | 8.8 | 14.0 | 9.4 | 7.4–11.5 | 11.9 | 12.8 | — |
| Period Index (%): | | | | | | | | |
| I. 1928–37 ... | 344 | 389 | 724 | 380 | 338–413 | 446 | 551 | 371 |
| II. 1937–50 ... | 193 | 155 | 252 | 195 | 178–204 | 251 | 250 | 174 |
| III. 1950–55 ... | 157 | 163 | 186 | 166 | 157–176 | 185 | 189 | — |
| IV. 1928–55 ... | 1,041 | 985 | 3,402 | 1,116 | 660–1,814 | 2,065 | 2,566 | — |

* The underlying computations carried more decimals than are reproduced here. This accounts for certain slight inconsistencies in the Table.

*a* From Table A 1 (Appendix).

*b* Obtained by substituting the values *u*, *v*, *w* in each of the four regression equations (I, II, III and IV). Thus the estimate for the period as a whole (IV) is derived from a separate regression, and differs from the result of linking the three sub-period growth rates. The latter operation yields an index of 1,230 per cent for 1955, with limits of 946–1,489 per cent.

*c* Allowing for possible deviations from z equal to the maximum errors of regression in the Western data (see Table III and Chart 1).

*d* Ts. S.U. *Narodnoye khozyaystvo*, S.S.S.R., Moscow, 1956, p. 45.

*e* Donald R. Hodgman, *Soviet Industrial Production, 1928–51*, Harvard, 1954, p. 89.

been derived by analogy with Western data. The intersects of the dotted lines with the vertical marked *U.S.S.R.* correspond to the ' limits ' of the regression estimates as stated numerically in Table IV. As the chart provides such a convenient opportunity for a summary of procedures and results, the author has not resisted the temptation to use it also as the framework for the growth rates of *large-scale* industry (official and revised) and of the relation in which they stand to his own, more inclusive, estimates. In making the comparison, however, the difference in coverage should always be borne in mind. In addition, it must not be forgotten that our estimates so far have been confined to *manufacturing*, and therefore differ from the other data not merely in the size of unit, but also in the type of operation covered. As will appear shortly, however, this latter qualification barely affects the comparisons suggested by the chart.

As regards the coverage of the manufacturing index, this must be presumed to be identical with that of the Western indices on which our regression is based. According to the O.E.E.C. the following major groups of the International Standard Industrial Classification (I.S.I.C.) are comprised in ' Manufacturing ':

| | | |
|---|---|---|
| Group | 20–21–22 | Food, beverage and tobacco manufacture. |
| „ | 23 | Mf. of textiles. |
| „ | 24 | Mf. of footwear. |
| „ | 25–26 | Mf. of wood, cork, furniture and fixtures. |
| „ | 27 | Mf. of paper and products. |
| „ | 28 | Printing, publishing, etc. |
| „ | 29 | Mf. of leather and products. |
| „ | 30 | Mf. of rubber products. |
| „ | 31 | Mf. of chemicals. |
| „ | 32 | Mf. of products of petroleum and coal. |
| „ | 33 | Mf. of non-metallic mineral products. |
| „ | 34 | Basic metal industries. |
| „ | 35–36–37–38 | Mf. of metal products, machinery, electrical apparatus, transport equipment. |
| „ | 39 | Miscellaneous Mfs. |

TABLE V. *Soviet Industrial Expansion—Comparison of Different Estimates*

| | *Author's Estimates* | | | | *Official Index c* | | *Hodgman large-scale Ind. d* | *Jasny All Ind. e* | *Clark All Ind. f* |
|---|---|---|---|---|---|---|---|---|---|
| | *Manufacturing a* | | *All Industry b* | | *All Industry* | *Large-scale Ind.* | | | |
| | *A* | *B* | *A* | *B* | | | | | |
| 1928... | 100 | 100 | 100 | 100 | 700 | 100 | 100 | 100 | 100 |
| 1929... | 115 | 116 | 115 | 116 | 120 | 125 | 120 | — | 115 |
| 1930... | 143 | 144 | 143 | 145 | 146 | 164 | 139 | — | 123 |
| 1931... | 168 | 168 | 169 | 169 | 176 | 202 | 164 | — | 123 |
| 1932... | 179 | 181 | 181 | 182 | 202 | 232 | 172 | 165 | 128 |
| 1933... | 201 | 202 | 202 | 204 | 213 | 251 | 192 | — | 146 |
| 1934... | 253 | 256 | 254 | 258 | 254 | 301 | 229 | — | 178 |
| 1935... | 304 | 313 | 303 | 312 | 312 | 370 | 295 | — | 200 |
| 1936... | 364 | 381 | 362 | 378 | 401 | 482 | 344 | — | 292 |
| 1937... | 383 | 404 | 380 | 400 | 446 | 537 | 371 | 287 | 310 |
| 1938... | 407 | 423 | 404 | 419 | 498 | 599 | — | — | 309 |
| 1939... | 428 | 436 | 425 | 433 | 578 | 691 | — | — | 324 |
| 1940... | 465 | 463 | 462 | 463 | 646 | 771 | 430 | 340 | 339 |
| 1946... | 362 | 394 | 365 | 395 | 495 | 584 | 304 | 238 | — |
| 1947... | 417 | 437 | 420 | 440 | 603 | 715 | 375 | 274 | — |
| 1948... | 514 | 521 | 514 | 521 | 761 | 903 | 464 | 323 | — |
| 1949... | 634 | 620 | 629 | 617 | 912 | 1,090 | 560 | 372 | — |
| 1950... | 742 | 704 | 733 | 700 | 1,119 | 1,355 | 646 | 424 | — |
| 1951... | 838 | 786 | 826 | 781 | 1,304 | 1,586 | 742 | — | — |
| 1952... | 934 | 861 | 918 | 853 | 1,454 | 1,780 | 807 | — | — |
| 1953... | 1,025 | 935 | 1,005 | 926 | 1,626 | 2,003 | 891 | — | — |
| 1954... | 1,114 | 1,003 | 1,093 | 995 | 1,841 | 2,277 | — | — | — |
| 1955... | 1,230 | 1,116 | 1,210 | 1,110 | 2,065 | 2,566 | — | — | — |

*a* Derived from the annual growth rates of fuel, steel, and electricity consumption (see Table A 1) by applying regression equations I, II and III, successively in the appropriate periods (= Index A), or regression equation IV throughout (= Index B).

*b* Derived from Manufacturing Index A and B respectively, by incorporating the growth rates of fuel production (Table A 2) and electricity production (= consumption; Table A 1). weighting was as follows: Manufacturing 91.35 per cent, Fuel Production 7.65 per cent. Electricity Production 1.00 per cent (see Table A 3).

*c* Ts. S.U., *Narodnoye khozyaystvo S.S.S.R.*, 1956, pp. 45 and 46.

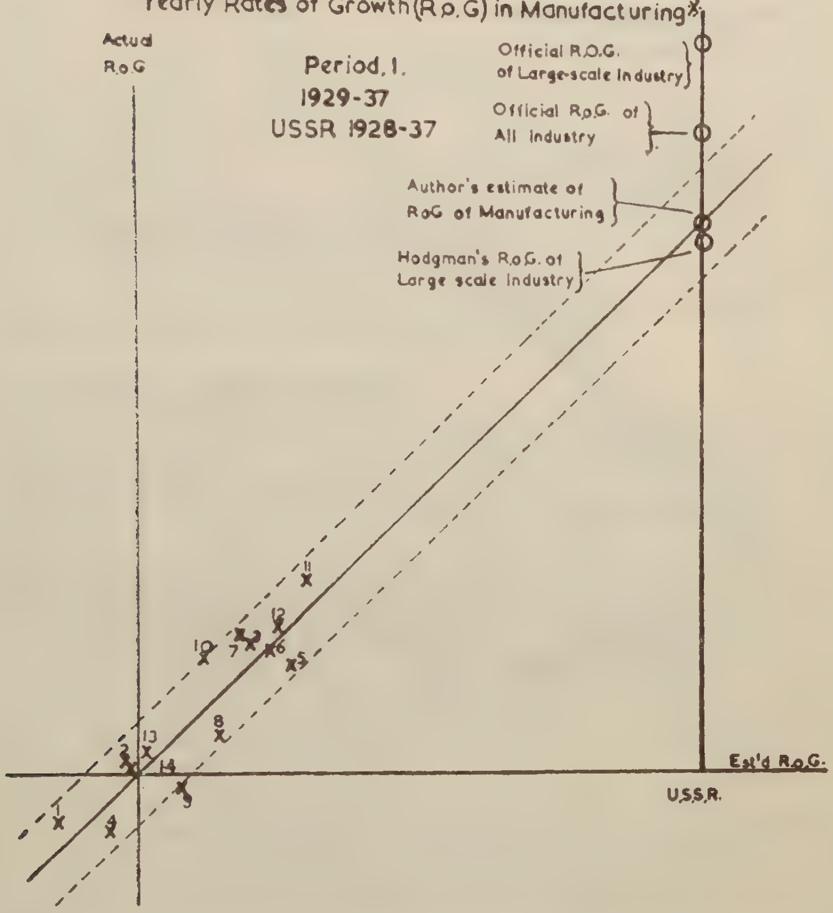
*d* Donald R. Hodgman *Soviet Industrial Production, 1928–51*, Harvard, 1954, p. 89. Index for 1952 and 1953 from *ibid.*, p. 134.

*e* Naum Jasny, *The Soviet Economy during the Plan Era*, Stanford, 1951, p. 23. The estimate for 1940 is between 330 and 350, according to area covered. The figure for 1950, which should read 420–427, is implied in Jasny's article: 'A close-up of the Soviet Five-Year Plan, in the *Quarterly Journal of Economics*, May, 1952, p. 163.

*f* Colin Clark, *The Conditions of Economic Progress*, second edition, London, 1951, p. 186.

Chart. I.

Scatter Diagrams of Correlation Between Estimated & Actual Yearly Rates of Growth (R.o.G) in Manufacturing*



The dotted lines allow for deviations equal to the maximum errors of regression (on either side) in the original data (see Table 3).

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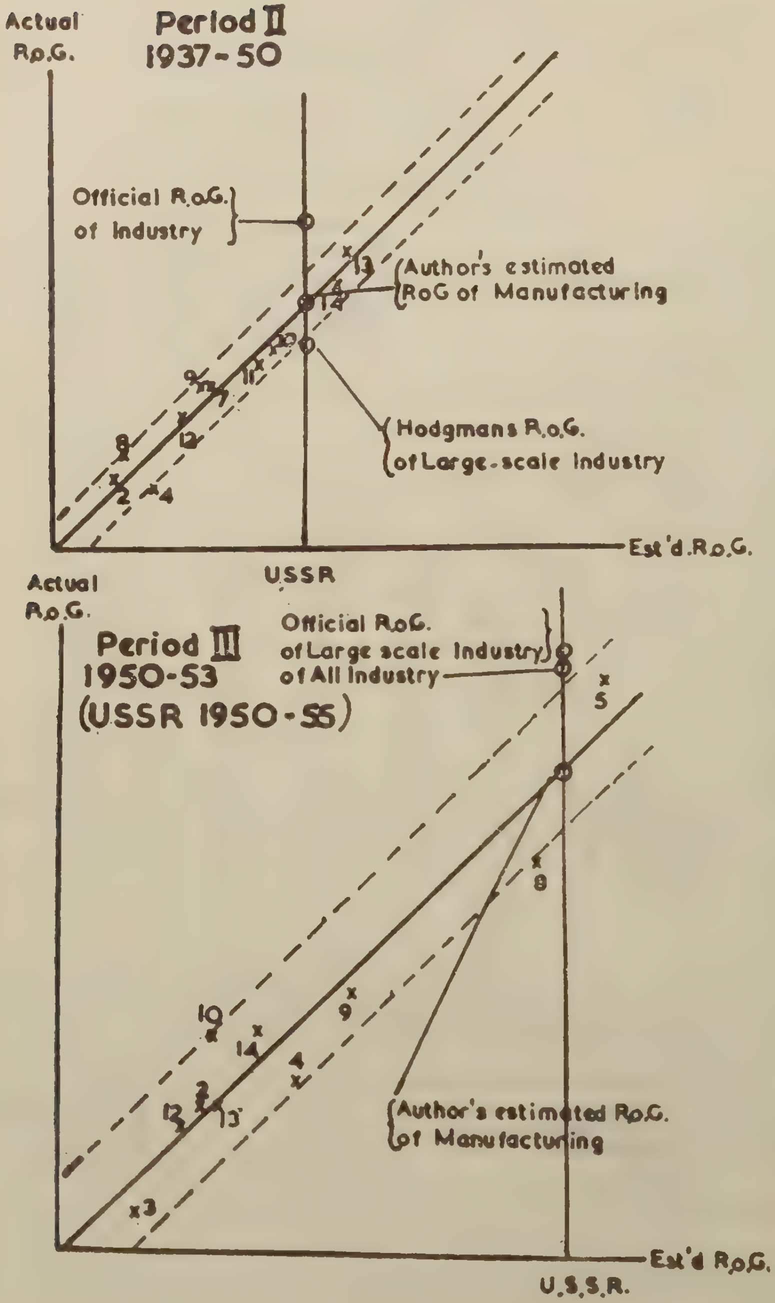
* The numbers refer to countries as follows :

| | | | | | |
|---|---|---|---|---|---|
| 1 | Austria. | 6 | Greece. | 11 | Sweden. |
| 2 | Belgium and Luxemberg. | 7 | Ireland. | 12 | United Kingdom. |
| 3 | Denmark. | 8 | Italy. | 13 | Canada. |
| 4 | France. | 9 | Netherlands. | 14 | United States. |
| 5 | Germany. | 10 | Norway. | | |

# CHART I (continued)



In the first columns of Table V two versions ('A' and 'B') of the complete time series for Soviet manufacturing are presented. Series 'A' was derived by substituting the yearly growth rates of fuel, steel, and electricity-consumption ($u$, $v$, and $w$) successively in regression equations I (1928–37), II (1937–50), and III (1950–55). Series 'B' is the result of the same substitution in regression equation IV, which covers the period 1928–55 as a whole. The yearly growth rates of manufacturing obtained in this manner were then 'linked' by continuous multiplication to form the series presented here. As will be seen, the discrepancy between the two versions 'A' and 'B', though quite noticeable in particular years, is hardly great enough to justify an attempt to investigate the respective merits of the two methods on theoretical grounds. The pre-war growth rates are practically identical, and the overall growth rates for the period differ by less than ten per cent (the *average* yearly growth rates are 9.7 per cent and 9.4 per cent for 'A' and 'B' respectively). Our result indicates that Soviet manufacturing has multiplied 11–12½ times since the inception of the Five-Year Plans.

*Soviet industrial production*

Our next task is the extension of the index in coverage from manufacturing to industry as a whole. In a country like the Soviet Union it is *a priori* unlikely that this will greatly affect the numerical values involved. Of the two major industrial branches omitted from manufacturing, mining and power generation, only the first has any sizable weight in total industrial production (say between 6 per cent and 10 per cent). But all the indications are that its rates of growth were fairly close to those of manufacturing during most of our period. Power generation, on the other hand, grew very much faster than manufacturing, but can have little weight in industrial production as a whole. The proposed adjustment of the index is therefore marginal in character and would hardly justify any refinements on the rough and ready method we have used.

To obtain an index for mining we have used the data on the output of various fuels already assembled in making our previous estimates. These were made commensurable in terms of calories and aggregated in the normal way (Table A 2). In this manner we have certainly accounted for the bulk of extractive industries, the only serious omission being the mining of ores and non-metallic minerals. However, since these branches are small in relative importance and very closely geared to manufacturing output, no significant distortion of the final index need be feared from this cause. The electricity component of the index is taken without adjustment from the consumption series of Table A 1.

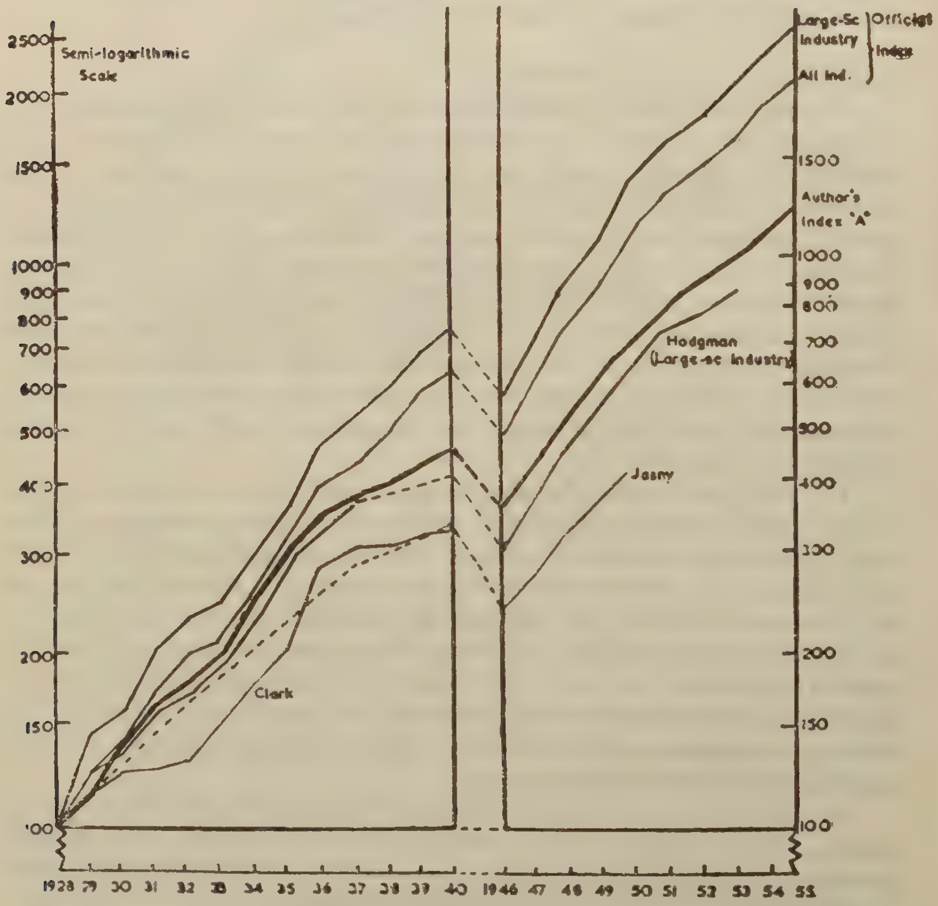
As regards the weighting of the three components, our choice was, as always, severely limited by the available data. Probably the most plausible measures of relative importance open to us were the contributions of the three sectors to the total wage bill of industrial workers in a fairly central year of our period (1940). The relevant data were derived as shown in Table A 3.

It was then an easy matter to aggregate the three component series into a total index of industrial production. Two indices ('A' and 'B') were obtained, according to the version of the manufacturing component chosen for incorporation in the index. Both are presented in Table V and compared with other well-known estimates of Soviet industrial growth. The results are illustrated graphically in Chart 2.

A brief glance at the chart will show that our series falls into the same sub-periods as the official Soviet index, though its movements in the various phases are considerably altered in scale, both absolutely and relatively to

Chart.2.

Soviet Industrial Production:– Authors Index 'A' Compared with Other Estimates



one another. We can now take the measure of these findings against the performance of the non-Soviet world, corresponding to the parallels we have previously drawn with the official Soviet index (see p. 4):

TABLE VI

| | | | Comparable expansion * | | |
|---|---|---|---|---|---|
| *Period* | *Soviet Union Estimated Growth-* | *in* | *Achieved in* | *by* | |
| 1. 1928–36 | 363% | 8 yrs. | 12 years. | Japan | (1893–1905) |
| | | | 13 ,, | South Africa | (1911–1924) |
| | | | 20 ,, | Russia | (1883–1903) |
| | | | 35 ,, | the World | (1870–1905) |
| 2. 1936–40 | 128% | 4 yrs. | 3 yrs. | South Africa | (1924–1927) |
| | | | 4 ,, | Russia | (1904–1908) |
| | | | 5 | Japan | (1905–1910) |
| | | | 6 ,, | U.S.A. | (1880–1886) |
| | | | 7 ,, | the World | (1905–1912) |
| 3. 1948–55 | 196% | 7 yrs. | 3 yrs. | †Japan | (1950–1953) |
| | | | 4½ ,, | †West Germany | (1949–53–4) |
| | | | 7 ,, | Italy | (1948–1955) |
| | | | 13 ,, | Canada | (1940–1953) |
| | | | 19 ,, | the World | (1870–1889) |
| 4. 1928–55 | 1,210% | 27 yrs. | 29 years. | South Africa | (1911–1940) |
| | | | 29 ,, | Japan | (1893–1922) |
| | | | 43 ,, | Sweden | (1870–1913) |
| | | | 54 ,, | Canada | (1870–1924) |
| | | | 75 ,, | the World | (1870–1945) |

* Manufacturing only. Sources: League of Nations, *Industrialization and Foreign Trade*, 1945, pp. 130, *et seq*. U.S. Bureau of the Census, *Historical Statistics of the United States*, and Supplement, O.E.E.C., *Industrial Statistics 1900–1955*, Paris, 1955, p. 6, U.N.O. Statistical Year Book, 1955, p. 116, *et seq*.

† Japan and West Germany had not, however, fully exhausted the potentialities of reconstruction by the beginning of the period quoted.

### *Doubts and qualifications*

Soviet industry is thought to differ markedly from the Western pattern by virtue of the traditional preference it gives to producer goods, both in point of output *volume* and output *growth*. Can we none the less 'extrapolate' the relationships observed in the West to Soviet conditions? There are grounds for believing that the procedure remains valid.

In the first place the differences in question may well be exaggerated. Even by the testimony of the official Soviet indices, which must be expected to inflate capital goods (both output and growth) more than consumer goods, the departure from Western performance is not excessive. A relation of 6 : 4 and 7 : 3 in favour of capital output, as claimed by the Soviets for 1940 and 1955 respectively, is probably not far removed from the normal ratios ruling French, Swedish, or German manufacturing industry. On the other hand, the degree of predominance claimed for capital goods in point of *growth rates* is certainly exceptional, particularly in the initial phases of the period when the West was passing through depression. But in later phases it was approached by Austria and the Netherlands, and in the early 'fifties it appears to have been greatly surpassed by Germany, Italy, Canada, and the United States.

In the second place, our estimates are based not on a *single* input series, but on conjunctions of *three* variates, and it is clear that the relationship in which these stand to one another leaves scope for a wide range of features capable of reflecting variations in product-mix and growth pattern. To some extent, therefore, the crucial differences will be automatically allowed for in the process of estimation.

There are, however, certain other weaknesses that cling to our estimates and should be clearly recognized:

1. The disparity between Western and Soviet performance in the period 1929–1937 was excessively great (see Chart 1, Period I). Our ' extrapolation ' therefore carries less confidence in respect of this period than in the case of later phases.
2. The most recent period for which Western statistics are available in the required detail (1950–53) is shorter than one would wish, although the practice of taking three-year moving averages at both ends somewhat lengthens the time span which is effectively involved.
3. Two of the inputs chosen (calorie consumption and electricity) are not confined to industrial uses, and may in part reflect the expansion of other sectors (*e.g.* transport and consumer demand).
4. There is some inevitable ' overlap ' between the two inputs mentioned: some fuel will be used to generate electricity, and a portion of the electricity produced will enter calorie consumption as water power.
5. The Western countries whose data contributed to our estimate belong to the ' developed ' world. It has proved impossible to include more backward areas, or countries whose industrialization is of recent date.

Most of these deficiencies are removable in principle. In practice, however, only some of them might be avoided, and even this would probably involve a disproportionate research effort yielding rapidly diminishing returns.

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# APPENDIX

## TABLE A1

*Estimated Soviet Consumption of Mineral Fuel and Water Power, Steel and Electricity*

| | *Consumption in mil. convent'l tons of 7,000 cal. per kg. a* | | | | | | *Steel consumption (mil. tons)* | *Electricity consumption (thou.-mil. kw.-hours)* |
|---|---|---|---|---|---|---|---|---|
| | *Coal and Lignite* *b* | *Oil and Prods.* *c* | *Natural Gas* *d* | *Peat* *e* | *Hydro-el. Energy* *f* | *Total Min'l Fuel and Water Power* | *g* | *h* |
| 1928... ... | 30.4 | 12.3 | 0.4 | 2.2 | 0.2 | 45.5 | 4.6 | 5.0 |
| 1929... ... | 33.8 | 13.7 | 0.4 | 2.8 | 2.3 | 51.0 | 5.3 | 6.2 |
| 1930... ... | 39.8 | 19.3 | 0.7 | 3.3 | 0.4 | 63.5 | 6.6 | 8.4 |
| 1931... ... | 47.5 | 24.1 | 1.1 | 5.1 | 0.4 | 78.2 | 7.3 | 10.7 |
| 1932... ... | 53.9 | 21.4 | 1.4 | 5.5 | 0.5 | 82.7 | 7.0 | 13.5 |
| 1933... ... | 63.8 | 23.2 | 1.5 | 5.7 | 0.8 | 95.0 | 7.5 | 16.4 |
| 1934... ... | 78.6 | 27.9 | 2.2 | 7.5 | 1.4 | 117.6 | 10.1 | 21.0 |
| 1935... ... | 91.4 | 30.5 | 2.4 | 8.1 | 2.2 | 134.6 | 13.0 | 26.3 |
| 1936... ... | 105.9 | 34.6 | 2.7 | 9.1 | 2.4 | 154.7 | 16.7 | 32.8 |
| 1937... ... | 107.2 | 37.2 | 3.0 | 9.8 | 2.5 | 156.7 | 17.9 | 36.2 |
| 1938... ... | 112.8 | 40.3 | 3.5 | 10.9 | 3.1 | 170.6 | 18.2 | 39.4 |
| 1939... ... | 127.7 | 41.0 | 4.0 | 12.2 | 2.8 | 187.7 | 17.6 | 43.2 |
| 1940... ... | 139.5 | 42.8 | 4.4 | 13.6 | 3.1 | 203.4 | 18.3 | 48.3 |
| 1946... ... | 135.1 | 33.2 | 5.0 | 11.5 | 3.6 | 188.4 | 13.3 | 48.6 |
| 1947... ... | 152.8 | 40.6 | 6.1 | 12.3 | 4.4 | 216.2 | 14.5 | 56.5 |
| 1948... ... | 174.3 | 44.4 | 6.7 | 13.1 | 5.6 | 244.1 | 18.6 | 66.3 |
| 1949... ... | 197.4 | 48.9 | 6.9 | 13.9 | 6.9 | 274.0 | 23.8 | 78.3 |
| 1950... ... | 218.5 | 53.1 | 8.1 | 14.8 | 7.6 | 302.1 | 27.8 | 91.2 |
| 1951... ... | 236.8 | 59.2 | 8.7 | 16.3 | 8.2 | 329.2 | 31.9 | 104.0 |
| 1952... ... | 252.4 | 66.2 | 8.7 | 15.2 | 8.9 | 351.4 | 35.1 | 119.1 |
| 1953... ... | 266.5 | 73.9 | 10.5 | 15.8 | 11.5 | 378.2 | 38.2 | 134.4 |
| 1954... ... | 270.2 | 83.0 | 11.4 | 18.5 | 11.2 | 394.3 | 41.1 | 150.6 |
| 1955... ... | 326.1 | 99.1 | 13.5 | 20.9 | 13.9 | 473.5 | 45.3 | 170.1 |

### NOTES TO TABLE A1.

*a* Conversion from natural units (metric tons, cubic meters, and kw.-hours) into 7,000-calorie equivalents was undertaken at the following rates: Hard coal 0.907, Lignite 0.486, Oil 1.4, Gas 1.3, Peat 0.41, Hydro-electric power 0.6. See G. Grossman in *Capital Formation and Economic Growth*, Princeton, 1956, p. 200.

*b* Production figures for hard coal and lignite are given separately in Ts. S.U., *Narodnoye khoayaystvo S.S.S.R.*, Moscow, 1956, p. 67. Net exports of hard coal: up to 1935 from *Sotsizlisticheskoye stroitel'stvo S.R.R.R.*, Moscow, 1936, pp. 686, 690; 1936–38 from A. Baykov, *Soviet Foreign Trade*, Princeton, 1946, Table V; 1939–40 assumed *nil*; 1946–50 (net imports) estimated in D. Shimkin, *Minerals, A Key to Soviet Power*, Harvard, 1953, p. 391, footnote 1. 1951–55 assumed to grow in step with production.

*c* Production figures from Ts. S.U., *op. cit.*, p. 59. Export figures: up to 1938 from A. Baykov, *op. cit.*, Table V; 1939 interpolated; 1940 implied in D. Skimkin, *op. cit.*, pp. 198 and 391; 1946–50 (net imports) estimated in *ibid.*, p. 391. 1951–55 net imports assumed *nil*, as estimated for 1950 (exports may have been approximately balanced by imports from the European satellites and Austria).

*d* Assumed equal to production throughout. Figures for 1928, 1932, 1937, 1950, 1954 and 1955 are from Ts. S.U., *op. cit.*, p. 55; 1930 from *Large Soviet Encyclopaedia*, 2nd ed. X, p. 40; 1929, 1931, 1933–5, interpolated according to the trend in *Sotsialist, stroitel'stvo*, 1936, p. 113; all other pre-war years by linear interpolation; 1946–49 trend of *Bulletin* (Munich Inst for the Study of the U.S.S.R.), August, 1955, p. 34, extended backward from 1950; 1951 8 per cent above 1950 (see *Results of Fulfilment of the 1951 Plan*, p. 10); 1952 assumed equal to 1951, as no increase was repeated; 1953, 9 per cent below 1954 (see *Pravda*, Jan. 21st, 1955, p. 1).

*e* Assumed equal to production throughout. Figures from Ts. S.U., *op. cit.*, p. 70; 1929–32 from *Sotsialisticheskoye stroitel'stvo*, 1936, p. 131; 1933–36 from A. E. Probst, *Osnovny,* *problemy* . . . , Moscow, 1939, p. 99; 1938 *Sots. stroitel'stvo*, 1933–38, p. 40; 1946 U.N.O., *Economic Survey of Europe since the War*, 1953, p. 42; 1939 and 1947–9 by linear interpolation

*f* Ts. S.U., *op. cit.*, p. 71.

*g* Production figures: 1928–35, *Sotsialisticheskoye stroitel'stvo, S.S.S.R.*, 1936 p. xxiii; 1936–48, Ts. S.U., *op. cit.*, p. 63. Net imports: up to 1938 from A. Baykov, *op. cit.*, Tables V and VI; 1938–48 assumed *nil*. Consumption figures after 1948 estimated directly: 1949–50 U.N.O., *Stat. Year-book* 1948, p. 247; 1951–53, *ibid.*, 1954, p. 283; 1954, *ibid.*, 1955, p. 309. 1955 assumed equal to production. *h* Ts. S.U., *op. cit.*, p. 71.

### Table A2

*Estimated Soviet Production of Mineral Fuel in Mil. Conventional Tons of 7,000 cal. per kg. a*

| *Year* | *Hard coal and Lignite b* | *Oil b* | *Peat and natural gas d* | *Total* |
|---|---|---|---|---|
| 1928... ... | 30.9 | 16.2 | 2.6 | 49.7 |
| 1929... ... | 34.9 | 19.2 | 3.2 | 57.3 |
| 1930... ... | 41.5 | 25.9 | 4.0 | 71.4 |
| 1931... ... | 49.0 | 31.4 | 6.2 | 86.6 |
| 1932... ... | 55.5 | 30.0 | 6.9 | 92.4 |
| 1933... ... | 65.5 | 30.1 | 7.2 | 102.8 |
| 1934... ... | 80.6 | 33.9 | 9.7 | 124.2 |
| 1935... ... | 93.4 | 35.3 | 10.5 | 139.2 |
| 1936... ... | 107.6 | 38.4 | 11.8 | 157.8 |
| 1937... ... | 108.5 | 39.9 | 11.8 | 160.2 |
| 1938... ... | 113.1 | 42.3 | 14.4 | 169.8 |
| 1939... ... | 123.6 | 42.4 | 16.2 | 182.2 |
| 1940... ... | 139.5 | 43.5 | 18.0 | 201.0 |
| 1946... ... | 127.9 | 30.4 | 16.5 | 174.8 |
| 1947... ... | 144.7 | 36.4 | 18.4 | 199.5 |
| 1948... ... | 164.3 | 40.9 | 19.8 | 225.0 |
| 1949... ... | 185.6 | 46.8 | 20.8 | 253.2 |
| 1950... ... | 204.9 | 53.1 | 22.9 | 280.9 |
| 1951... ... | 222.2 | 59.2 | 25.0 | 306.4 |
| 1952... ... | 236.8 | 66.2 | 23.9 | 326.9 |
| 1953... ... | 250.1 | 73.9 | 26.3 | 350.3 |
| 1954... ... | 271.3 | 83.0 | 29.9 | 384.2 |
| 1955... ... | 306.3 | 99.1 | 34.4 | 439.8 |

*a* For conversion coefficients see Table A 1, note *a*.

*b* Ts. S.U. *Narodnoye khozyaystvo S.S.S.R.*, Moscow, 1956, pp. 67 and 69.

*d* Table A 1: Sum of columns 3 and 4.

### Table A3

*Estimated Share of Fuel Production, Electric Power, and Manufacturing in the Total Wage Bill of Industrial Workers in 1940*

|  | *Proportion of Industrial Workers* | *Average Wage of Industrial Workers* |  | *Proportion of Total Wage Bill* |
|---|---|---|---|---|
|  | *a* % | *(ruble/ year)* | *(per cent of ' total ')* | *e* % |
| Fuel Industry ... ... | 6.4 | 5,139*b* | 119.5 | 7.65 |
| Electric Power ... ... | 1.0 | 4,300*c* | 100.0 | 1.00 |
| All Other* ... ... | 92.6 | 4,242 | 98.6 | 91.35 |
| Total ... ... ... | 100.0 | 4,300*d* | 100.0 | 100.00 |

* Presumed identical with manufacturing.

*a* Ts. S.U., *Narodnoye khozyaystvo S.S.S.R.*, Moscow, 1956, p. 43.

*b* Weighted average of wages paid by the People's Commissariat for Oil industry (4,657 ruble) and Coal Industry (5,229 ruble) as implied in State Plan for 1941 (reprinted by the American Council of Learned Societies), p. 513. The weights are in proportion to the number of industrial workers in these departments as planned for 1941.

*c* Implied in *State Plan for 1941*, p. 513.

*d* The planned average wage for all Industrial departments in 1941 was 4,576 ruble (obtained by dividing planned total Wage-Bill by planned employment; see *State Plan for 1941*, p. 514). The 1940 wage is obtained by dividing this figure by 106.5 per cent, the planned increase in industrial wages (*ibid.*, p. 513). *e* Col. 1 by col. 3.

Chart. A.I.

Correlation between Average Yearly Growth Rates of Manufacturing, Consumption of Fuel & Water Power, Steel Consumption & Electricity Consumption.

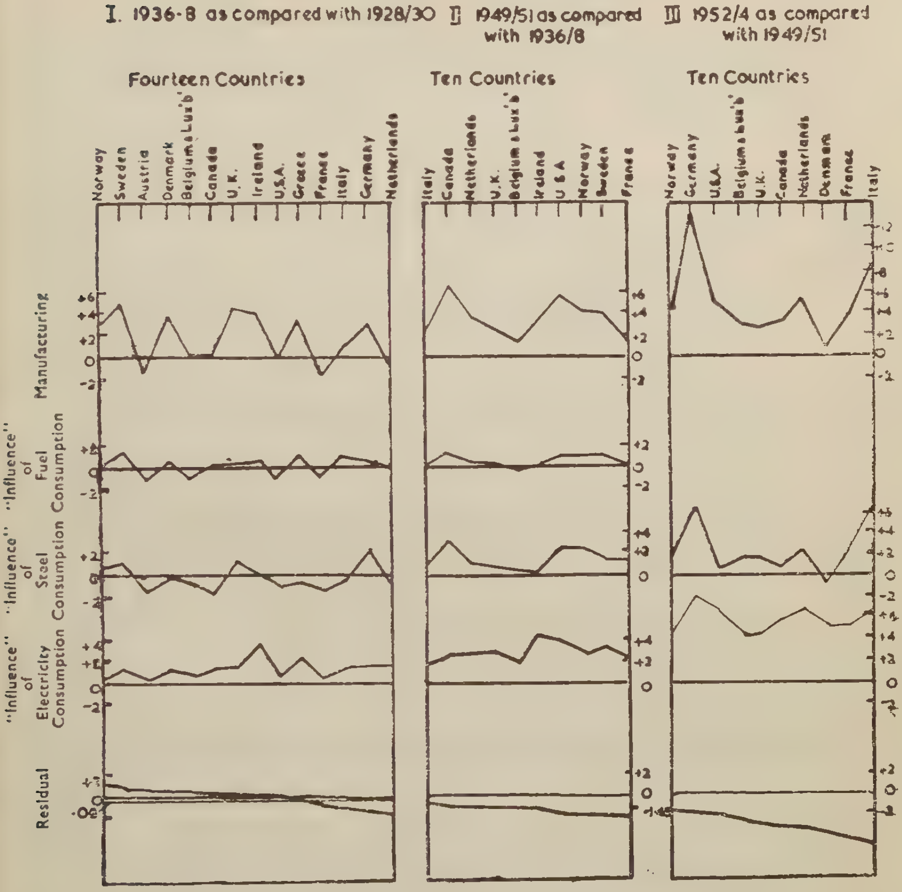


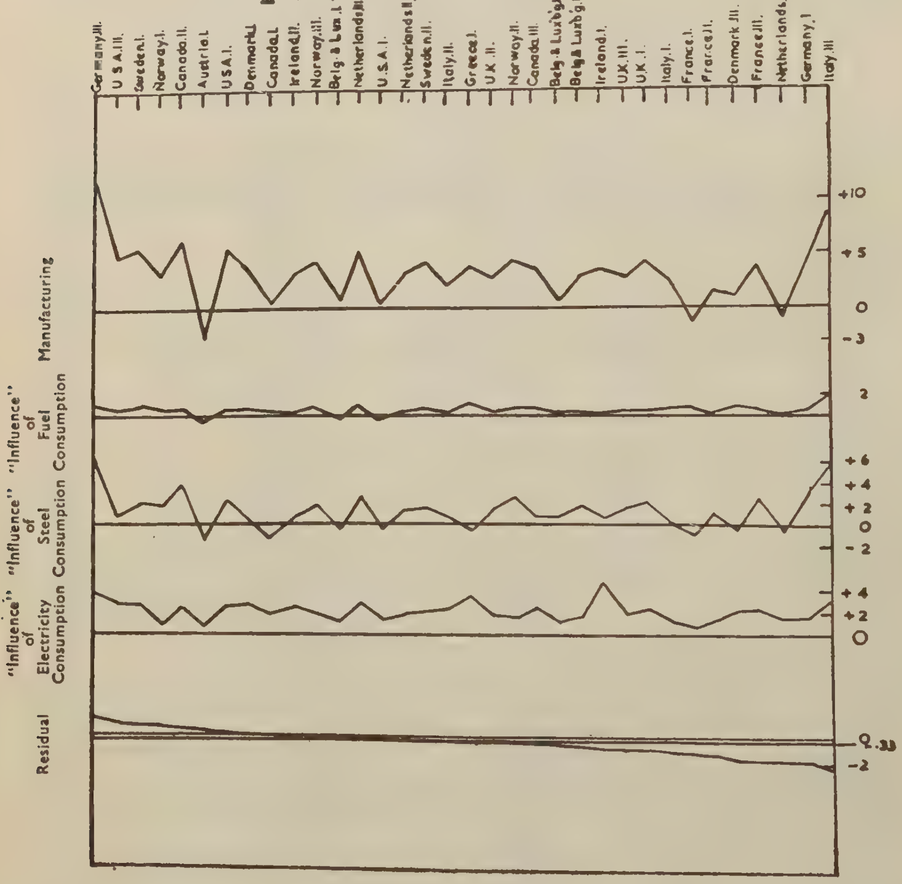
Chart.A.2.

Correlation between Average Yearly Growth Rates of Manufacturing, Consumption of Fuel & Water Power, Steel Consumption, & Electricity Consumption.

Fourteen Countries in three Periods :

I 1936/38 as compared with 1928/30 II 1949/51 as compared with 1936/38

III 1952/54 as compared with 1949/51



# U.K. BALANCE OF PAYMENTS, 1946-55

*By* Joan Mitchell

For the past two years, the United Kingdom's balance of payments has shown signs of fresh weakness. First, the undoubted improvement in the balance during 1956 occurred with production no longer increasing. Whether improvement on these terms is worth having—or should be so-called—is more doubtful than the improvements which can be seen before then. Before 1956, what improvement there was, took place while production was increasing for the most part at a steady, and not unsatisfactory rate. Then, with production still stagnant, the balance of payments once more swerved out of equilibrium as a result of the Suez crisis and other Middle Eastern troubles late in the year. Since then, although the current account so far shows a welcome surplus, the underlying weakness resulting from our international banking activities is clear in spite of new borrowing. It is evident that 1955–56 saw the end of another post-war phase in the United Kingdom's overseas balance, no less than that of the western world generally. It is now an appropriate time to review the general trend of development in the balance of payments in the decade since the war, with signs of improvement in mind, particularly those which might be hoped to continue again in the near future.

There have been three distinct phases in the first 10 post-war-years: the four years 1946–49, the period of reconstruction; the three years 1950–52, the period of the Korean war; and the three years 1953–55, the period of relative calm so far as international economic disturbance is concerned. Comparing the balance of payments figures for these three phases, some general trends of development do appear, though whether they should be described as progress is not always so apparent.

In Table I below, the U.K. balance of payments in 1946–49, 1950–52, and 1953–55 is shown, by means of an annual average for each period. Almost any single year of international payments is extraordinary, either because there have been special non-recurrent transactions, or because international trade has temporarily contracted or expanded while stocks are used or replaced, even if production and consumption are steady. Since the items in the balance of payments most subject to these incidental variations are large, the balance itself in individual years shows considerable deficits and surpluses, which are corrected partly at least in the next year, without any deliberate remedies by the Government. However, these relatively unimportant fluctuations (analytically, not politically, speaking) have been removed by taking an average for each phase. The current balance, and the form in which the items appear in the Table, are not quite the same as those used in the White Papers, since the strict White Paper form is not the most suitable for showing underlying trends of development. The definitions of the items, and the accounting conventions are generally as used by the official statisticians.

There are two exceptions to the usual form of the figures. All identifiable

### TABLE I

*U.K. balance of payments 1946–55*
*(£ million, annual average)*

| **Current account**[1] | *1946–49* | | *1950–52* | | *1953–55* | |
|---|---|---|---|---|---|---|
| Imports | 1,604 | | 2,939 | | 3,110 | |
| Exports | 1,376 | | 2,609 | | 2,851 | |
| Trade balance | | −228 | | −330 | | −259 |
| Shipping (net) | + 58 | | +128 | | +135 | |
| Interest, profits and dividends (net) | + 85 | | +125 | | + 71 | |
| Travel (net) | − 38 | | − 19 | | − 6 | |
| Other (net) (excluding gifts) | +136 | | +266 | | +278 | |
| Invisibles (net excluding Government transactions) | | +241 | | +500 | | +478 |
| Government: | | | | | | |
| Military and the like | − 96 | | − 95 | | − 94 | |
| Administrative, diplomatic, etc. | − 29 | | − 30 | | − 29 | |
| Government (net) | | −125 | | −125 | | −123 |
| **Current balance goods and services** | | −112 | | + 45 | | + 96 |
| Migrants' funds, legacies, etc. | − 19 | | − 8 | | − 10 | |
| U.K. Government grants to other countries | − 75 | | − 76 | | − 49 | |
| Government grants to U.K. | +108 | | +150 | | + 66 | |
| Unilateral transfers | | + 14 | | + 66 | | + 7 |
| Change in assets | | − 98 | | +111 | | +103 |
| **Investment and financial account** | | | | | | |
| Government[2] | | | | | | |
| Subscriptions to I.M.F. & I.B.R.D. | −140 | | — | | — | |
| Other investment (net) | +296 | | − 36 | | − 35 | |
| Total government | +156 | | | − 36 | | − 35 |
| Private capital and balancing item (net)[2] | | −134 | | −145 | | − 97 |
| Change in £ holdings[3] by I.M.F. and I.B.R.D. | +144 | | − 3 | | − 33 | |
| Other | −103 | | + 25 | | +119 | |
| Total change in £ holdings[4] | | + 41 | | + 22 | | + 86 |
| Change in gold and $ reserves | | + 39 | | − 19 | | − 33 |
| Change in other reserves[5] | | − 4 | | + 67 | | − 24 |
| Total investment and financing | | + 98 | | −111 | | −103 |

[1] Credit +; debit—.

[2] Borrowing (or repayment to U.K.) +; lending (or repayment by U.K.) —.

[3] Increase in £ held by official bodies overseas +; decrease —.

[4] Addition to reserves —; reduction +.

[5] Addition to reserves (or decrease in debit or increase in credit balance with E.P.U.) —; reduction in reserves (or increase in debit balance or decrease in credit balance with E.P.U.) +.

gifts or grants have been removed from the current balance, which now becomes the current balance of goods and services.[1] Government transactions on current account, other than grants, have been divided into two sub-items: ' administrative, diplomatic, etc.,' and ' military and the like ', to distinguish between the expenses of normal Government activities overseas, such as maintaining embassies, arranging or attending conferences, or paying normal annual subscriptions to international agencies; and those on the execution of particular political decisions, such as rearmament and defence programmes and other schemes to finance them. ' Military and the like ' consists of the item ' Government military ' shown under the debit items of the current account in the white papers, plus ' Government: other ' under the credits.[2]

The remaining Government current transactions according to the white papers comprise ' Colonial grants ' and ' relief and other grants ' from the debits, and ' grants ' from the credits. These latter receipts are small, and are of the nature of special supplements to the two major U.S. aid programmes of the period, the European Recovery Programme and the Mutual Security Programme.[3]

There is something to be said also in favour of showing a balance including the current balance of goods and services, unilateral transfers, and private capital movements. Autonomous capital transactions either need financing from current receipts, or provide funds to meet current payments, as much as current account transactions. In the last few White Papers the Treasury has begun to adopt this ' alternative presentation ', which at least has the merit of describing more clearly the changes in overseas transactions leading to a rise or fall in the reserves. The main disadvantage is a practical one: we have no wholly reliable figures for private lending and borrowing in the ordinary sense in recent years, and none at all before 1952. Certainly before this date, and probably to some extent still, some (but not all) speculative movements of short-term capital are included. There is also the question of the ' balancing item ', which includes errors on either account. This is commendably small now in relation to the whole account; but is sometimes disconcertingly large in relation to the ' other capital (net )' item with which it is included. However, taking an average for a period should minimise these difficulties, since some of the essentially short-term speculative movements and most of the ' balancing item,' ought to disappear, if the periods have been chosen wisely.

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[1] And corresponds to the definition recommended by I.M.F.

[2] It is possible that some receipts other than strictly military may have been included; but this is unlikely, and would in any event be negligible. The most important receipts are from the expenditure of U.S. and Canadian forces stationed in U.K., and from U.K. ' off-shore ' sales to U.S. government of some supplies destined for U.K. or other troops.

[3] In Table I, the item ' U.K. government grants to other countries' includes colonial relief and similar grants, as well as grants to O.E.E.C. countries, and revaluation payments. The item ' Government grants to U.K. ' consists of all such transactions shown in the white papers, including U.S. Government grants referred to above, E.R.P. aid, defence aid and gifts from Australia (in 1947 and 1949) and New Zealand (in 1947).

The various balances are compared in Table II:

TABLE II

*Various U.K. balances compared*
*(£ million)*

| | *1946–49* | *1950–52* | *1953–55* |
|---|---|---|---|
| *White Papers* | | | |
| 1. Balance of current transactions (excluding defence aid) ... ... ... ... ... ... ... | −177 | + 6 | + 37 |
| 2. Balance of current transactions (including defence aid) ... ... ... ... ... ... ... | −177 | + 48 | +102 |
| *Other definitions* | | | |
| 3. Balance of goods and services ... ... ... | −112 | + 45 | + 96 |
| 4. Balance of goods and services and unilateral transfers (= change in overseas assets)... ... | − 98 | +111 | +103 |
| 5. Balance of goods, services, private transfers and private capital ... ... ... ... ... | −265 | −108 | − 11 |

It can be seen that four of the five possible balances show the same general trend of improvement, though the extent of the improvement, and the nature of the balance reached by 1953–55 are considerably different.

Returning to Table I, the results of this analysis may now be examined. By far the largest items in the balance are the trade figures. The trade balance improved in 1953–55 as compared with 1950–52, but it was still worse than in 1946–49. However, over the period, the value of both imports and exports have risen steeply, partly due to price increases and partly due to increase in volume. The trade deficit as a proportion of the import bill had consequently fallen from about 14 per cent in 1946–49, to 11 per cent in 1950–52, and to about 8 per cent in 1953–55. In this sense there is evidence of improvement. The import bill and trade balance clearly have a strong influence on the current balance, and consequently on the state of the reserves, but not by any means a determining influence.

The balance of invisible transactions has virtually doubled in the post-war years, from a surplus just about large enough to make up the trade deficit, to a surplus some £200 million greater than the trade deficit. Signs of improvement can be seen in each of the separate items except interest, profits and dividends.

So far as shipping is concerned, greater shipping capacity, higher freight rates, and the general increase in world trade, have resulted in continuously increasing earnings.[1] Net earnings more than doubled between 1946–49 and 1953–55. Between 1950–52 and 1953–55 they increased by only another £7 million a year; and this may be a sign that shipping earnings have reached a level which it will be difficult to increase much further. The marked improvement in the balance of travel expenditure is due to the much increased receipts of the tourist trade in this country, balanced by a more modestly increased expenditure by United Kingdom tourists overseas. There still remains a small annual average deficit on travel, which may well be difficult to eliminate.

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[1] It should be remembered that these figures include dry cargo shipping only. The net earnings of U.K. tankers are included with other oil transactions in ' other (net) '.

For interest, profits and dividends, the 1950–52 and the 1953–55 figures include annual payments of interest on the U.S. and Canadian lines of credit. This accounts for —£26 million a year in 1950–52, and —£38 million a year in 1953–55. Even apart from this extra payment, there is little sign of real improvement here, nor can any be expected.

The most outstanding improvement of all is shown by the figures for 'other (net)', which includes among its major items the net earnings of the United Kingdom's interests in oil companies. The surplus contributed by these transactions (which also include such things as earnings from insurance, banking and other commercial services) was more than twice as great in 1953–55 as in 1946–49. By 1953–55 it was by itself enough to counter the trade deficit. This is perhaps the most notable development in a general way in the U.K. balance of payments over the ten post-war years.

The net effect of current Government transactions has remained remarkably constant throughout the period. Military expenditure has increased steadily since 1950. But increasing expenditure incurred by participation in international defence schemes has been balanced partly by increasing receipts. Members of overseas countries' forces are frequently stationed in this country, with valuable foreign currency to spend, and they pay for using U.K. installations in foreign currency. However the total burden of defence expenditure on the U.K. balance of payments must be more than the £94 million a year shown in Table I. The extra raw materials imported for this purpose, and the extra U.K. exportable goods pre-empted for defence must account for some unknown part of the trade deficit.

As a result of all these changes, the current balance of goods and services has improved from an annual deficit of over £100 million in 1946–49 to an annual surplus nearly as great in 1953–55. Excluding the Government's military expenditure from the reckoning, the improvement has been even more marked, from a negligible deficit in 1946–49 to a surplus of not far short of £200 million a year in 1953–55—a figure in excess of 1 per cent of the national product. There is some evidence here to support the view that the United Kingdom's effort to right its overseas balance, and become again a provider, even if a modest one, of capital for other Commonwealth or under-developed countries, has been throughout the period commensurate with the need. It is the wasteful political divisions in the world that have diverted the proceeds of those efforts to other less constructive purposes.

The net balance of unilateral transfers (overseas grants and gifts) has not been so large as is sometimes imagined in any of the post-war periods. Private transfers in the form of legacies, gifts or migrants' funds result in a small but persistent deficit. This is accounted for by such things as gift-parcels to U.K. forces serving overseas, and the balance of emigrants over immigrants.[1] Government grants made by other countries (mainly the U.S. and Canadian governments) to U.K. have been on balance larger than grants made by the U.K. government to overseas countries in each of the three periods; but only in the second period was the inflow very greatly in excess of the outflow.[1] The surplus in 1950-52 includes the second highest single annual grant under E.R.P. (in 1950) and also the highest single annual grant of defence aid (in 1952).

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[1] And by emigrants being richer, and therefore having more to transfer than immigrants.

The United Kingdom's difficulties in financing its overseas transactions, and the progress made in reducing those difficulties, cannot be understood without reference to capital movements. A glance down the three columns of major items will show that the outflow of private capital in all periods has been of major importance. Exactly how great this has been is uncertain, owing to the inclusion of the balancing item. The figures shown in Table I probably overstate the outflow for 1946–49, overstate it slightly for 1950–52, and understate it considerably for 1953–55. In other words, the outflow of private capital (not including unrecorded changes in commercial credit, which is regarded as part of the balancing item) has probably been approaching £100 million (though rather less) a year in 1946–49; of the order of £100 million a year in 1950–52, and considerably more than £100 million a year in 1953–55 (estimated by the Treasury at something like £160–170 million a year for this period). To put very tentative figures on it, they might read:

1946–49 —£75 million a year.
1950-52 —£125 million a year.
1953-55 —£160 million a year.

Let us hasten to add that it would be a mistake to try to substitute these figures in Table I as it stands. If we want a line ' private capital ' reading as above, we must also either amend the current balance to include the remaining balancing item (that is, assuming the balancing item consists mostly of errors and omissions on the current account) or include a separate line among the capital items for the balancing item (that is, assuming that the balancing item consists mostly of unrecorded changes in commercial credit). Therefore, when we turn to the question of how successive U.K. governments have managed to finance the net and capital outflows, we have the same figure in each case to account for (see line 5, in Table II).

It is clear that the increasing flow of private capital has been made possible by the improvement of the current balance. Taking the two items together, the average annual outflow had been nearly eliminated by 1953–55, leaving Government grants out of the reckoning altogether.

However, Government obligations have also had to be financed, and have contributed to the continuing though dwindling drain on our international assets. In 1946–49, the total annual net outflow due to the current balance, plus private gifts, plus private capital, was £265 million. In addition, our obligations were increased by grants made to other countries; by subscriptions to the International Monetary Fund and the International Bank; and by releases of sterling from accumulated balances. First there was the £75 million a year[1] of grants to other countries made during this period. The total subscription paid to I.M.F. and I.B.R.D. (as shown in Table I) was the equivalent of £140 million a year, but most of this was sterling. The overseas currency outflow (that is the gold payments due for the subscriptions) was equivalent to £16 million a year. Finally, there were the outstanding sterling balances, some of which the U.K. was obliged to repay during the period. How much of the actual reduction (of £103 million a year) in balances held by official bodies (other than I.M.F. and I.B.R.D.) ought to be counted as an obligation to be financed is difficult to say. Perhaps the best available alternative figure is the total of releases from blocked balances under various formal agreements. These amounted to some £85 million a year for 1946–49.

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[1] For Government grants, the division at 1949–50 is perhaps misleading, since the second period as shown contains a large slice of E.R.P. aid, meant to alleviate reconstruction problems, and appropriated before the problems of the Korean war became clear. However, alternative treatment of the figures only modifies the analysis to a small extent. Taking an annual average of 1946–50, Government grants received by U.K. come to +£135 million, and the annual balance of grants to +£41 million, still far short of the annual deficit in the current balance of goods and services. Taking an annual average for the first two periods together, Government grants (to U.K.) come to +£112 million. This gives a modest surplus of grants for the reconstruction period, with a slightly larger one for 1950–52 (viz. +£28 million for 1946–49, and +£38 million for 1950–52).

The total outflow to be financed by grants, loans or changes in currency balances was therefore £441 million a year. This drain was paid for as to £108 million a year by grants, to £296 million a year (net) by Government borrowing, and to the remaining £37 million by reduction in reserves. This latter reduction in reserves was made up of a reduction of £39 million a year in the dollar reserves, a small increase of £4 million a year in reserves of other foreign currency, and a small net addition of £2 million a year to overseas sterling holdings (including I.M.F. and I.B.R.D.).

In the Korean period 1950–52, the total net outflow from current account and private capital transactions was £108 million a year. To this must be added £36 million a year of Government obligations to repay former loans (including repayments of the U.S. and Canadian lines of credit from 1951 onwards). Grants to other countries amounted to another £76 million a year. The total drain to be financed was therefore £220 million a year this time. Grants to U.K. government accounted for £150 million a year, leaving £70 million a year to be financed by changes in reserves. Almost the whole of this was accounted for by the use of £67 million a year of reserves other than gold and dollars (mostly by using E.P.U. credits). The remaining £3 million a year is made up of net increase of £19 million a year in gold and dollar reserves, and an increase of £22 million a year in overseas holdings of sterling.

In the third period, the total net outflow from current and private capital transactions had been reduced still further to a mere £11 million a year. To this must be added £35 million a year of Government repayment obligations, and £49 million a year of grants by U.K. government. The total net drain was therefore £95 million a year. Grants from U.S. government covered £66 million a year of this, leaving £29 million a year to be accounted for. This time, reserves of both gold and dollars and other currencies increased substantially, by £57 million a year together. The net £86 million a year of financing was provided by the increase in overseas holdings of sterling. (Holdings by I.M.F. and I.B.R.D. were reduced by £33 million a year in 1953–55, and those of other holders increased by £119 million a year).

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[1] £15 million a year of this consist of payments made in 1949 to compensate a number of countries for the reduced value of their sterling holdings after devaluation.

These financing operations are summarised in Table III.

TABLE III

*Financing U.K. balance of payments 1946–55*
*(£ million, annual average)*

| | *1946–49* | *1950–52* | *1953–55* |
|---|---|---|---|
| Balance of goods, services, gifts and private capital ... | −265 | −108 | − 11 |
| *Other obligations:* | | | |
| Subscriptions to I.M.F. and I.B.R.D. (gold only) ... | − 16 | — | — |
| Releases from blocked £ balances ... ... ... | − 85 | — | — |
| Repayments former Government loans ... ... | — | − 36 | − 35 |
| U.K. government grants ... ... ... ... | − 75 | − 76 | − 49 |
| Total drain ... ... ... ... ... ... | −441 | −220 | − 95 |
| Financed by: | | | |
| Grants to U.K. ... ... ... ... ... ... | +108 | +150 | + 66 |
| Government borrowing (net) ... ... ... ... | +296 | — | — |
| Use of gold and $ reserves ... ... ... ... | + 39 | − 19 | − 33 |
| Use of other reserves ... ... ... ... ... | − 4 | + 67 | − 24 |
| Increase in overseas sterling holdings ... ... | + 2 | +22 | + 86 |
| Total financing ... ... ... ... ... ... | +441 | +220 | +95 |

By the mid-1950s, the U.K. has succeeded in earning enough overseas to become once more a net lender to the rest of the world, a net lender to the tune of some £100 million a year, in spite of continuing military expenditure of about that much again. But the continuing drain, and hence the continuing financial difficulties, are explained by the fact that the U.K. has actually been giving, lending and repaying for former loans a total of about £200 million a year. Looking to the future, and thinking in terms of deliberate plans for investing £100–200 million a year in underdeveloped areas, the changes required in the British economy are perhaps unduly minimised by these figures alone. It must be pointed out that a large and increasing amount of capital flowing out for investment overseas has been uncontrolled, sometimes in spite of attempts at control, and has not therefore been going entirely where it might most be needed from a national or international point of view. Nevertheless, such progress apparent in the figures so far is in the direction of such an achievement. Our capacity to invest more in future, without chronic or growing financial difficulties, seems to depend mainly on four things. First the trade balance must be improved, or at least not allowed to worsen. Secondly, our net earnings from oil must increase further (after recovering as rapidly as possible what must have been lost as a result of the Suez Crisis). Thirdly, net military expenditure must not rise further, and if possible must be reduced. Lastly, any extra flow of capital overseas must take the form of lending as part of an investment programme (not necessarily Government lending) rather than as uncontrolled flight.

So far, improvement has only been shown in terms of general balance of payments figures, taking all the rest of the world as one. These figures have their uses, for it is these which measure whether, in the general sense, the United Kingdom is paying its way. But from the point of view of relieving the country of periodic drains in the gold and dollar reserves, progress in balancing transactions with the main currency areas is more important.

Table IV shows the U.K.'s balance of payments since the war in the same form as Table I, but for non-sterling areas only. The results make interesting contrasts to those of Table I. The same general improvement can be seen, in that the current balance is successively better. But that balance, whether it is defined as the balance of goods and services, or whether gifts or private capital movements are added, still shows a substantial deficit.

The separate items show less certain evidence of sustained improvement in all senses, though there is some.

The trade balance shows the most noticeable improvement between 1946-49 and 1953–55, though it has not been continuous. Further improvement here cannot be assumed from any statistical evidence; but the relative size of the trade deficit with non-sterling countries makes it probably the most important single determinant of any future progress. Perhaps there are grounds for modest optimism in the fact that the 1953–55 deficit was markedly lower than the 1946–49 one—in contrast to the total trade deficit shown in Table I.

Earnings from invisible transactions have increased in total, though their amount is still only enough to cover less than half the trade deficit. Examination of the sub-items gives little cause for optimism here. Net earnings from dry cargo shipping have risen since 1946–49, but show a fall in 1953–5 compared with 1950–52. It seems unlikely that any considerable increase can be expected in future. Interest, profits and dividends now involve a net annual payment, large enough to absorb earnings from shipping, and more besides. If the payments from 1951 onwards on the U.S. and Canadian credits are excluded, there have been small, but not increasing, earnings here, as later details show. Foreign travel still involves us in net payments in non-sterling areas, though these are now very small. Other transactions (which include the oil companies) accounted for a little less than total invisible earnings up to 1952. From 1953–55 they account for the whole of it, and pay for a small deficit on other invisible transactions besides. What can be expected here in future is questionable. Increased production and sales of oil involve extra payments to non-sterling countries for royalties, local services and equipment as well as possible extra receipts from overseas sales.

Government transactions have been shown in the same form as in Table I, though the division between the three items, military, administrative and

TABLE IV

*U.K. balance of payments with non-sterling world 1946–55*
*(£ million, annual average)*

| | *1946–49* | | *1950–52* | | *1953–55* | |
|---|---|---|---|---|---|---|
| **Current account—** | | | | | | |
| Imports | 1,028 | | 1,788 | | 1,759 | |
| Exports | 727 | | 1,405 | | 1,535 | |
| Trade balance | | −301 | | −383 | | −224 |
| Shipping (net) | + 13 | | + 25 | | + 21 | |
| Interest, profits and dividends (net) | + 14 | | − 10 | | − 28 | |
| Travel (net) | − 17 | | − 9 | | − 8 | |
| Other (net) excluding gifts | + 46 | | +112 | | +115 | |
| Invisibles (net) (excluding Government transactions) | | + 56 | | +118 | | +100 |
| Government: | | | | | | |
| Military and the like | − 44 | | − 17 | | − 7 | |
| Administrative, diplomatic, etc. | − 28 | | − 29 | | − 28 | |
| Government (net) | | − 72 | | − 46 | | − 35 |
| Current balance, goods and services | | −317 | | −311 | | −159 |
| Migrant's funds, etc. | − 8 | | − 10 | | − 13 | |
| U.K. government grants | − 43 | | − 46 | | − 8 | |
| Government grants to U.K. | + 97 | | +150 | | + 66 | |
| Unilateral transfers | | + 46 | | + 94 | | + 45 |
| Change in assets | | −271 | | −271 | | −114 |
| **Investment and financing account** | | | | | | |
| Government lending or borrowing | | +268 | | − 15 | | − 18 |
| Private capital and balancing item (net) | | + 36 | | − 4 | | + 18 |
| Change in sterling holdings (of non-sterling countries) | | − 40 | | −106 | | − 27 |
| Change in gold and dollar reserves | | + 39 | | − 19 | | − 33 |
| Change in other reserves | | − 4 | | + 67 | | − 24 |
| Net change on capital account | | +299 | | − 77 | | − 84 |
| Purchases of gold from R.S.A. | | + 72 | | + 83 | | +131 |
| Other transfers between R.S.A. and non-sterling world | | −100 | | +211 | | + 67 |
| Total investment and financing | | +271 | | +271 | | +114 |

grants, is partly guesswork by the author. It is based on a sweeping, but perhaps not unreasonable, general assumption that Government expenditure in sterling countries, other than by means of colonial and relief or similar grants, consists almost entirely of 'military and the like'. Moreover, the 1946–49 figure for U.K. government grants is based on an assumed division of relief and rehabilitation grants between sterling and other countries. However, so long as importance is attached only to orders of magnitude, the figures as shown are not far from the truth. It can be seen then, that *direct* net expenditure on defence in non-sterling countries is now of negligible proportions. Such importance as military expenditure has is in influencing the trade balance, and here it might well be vital.

Nevertheless, for all the qualifications above, the current annual deficit with non-sterling countries has been halved between 1946–49 and 1953–55.

Capital flows, apart from Government borrowing in 1946–49, are relatively small. Non-sterling resources have been needed to finance several capital outflows. These are of three kinds: the net outflow of Government repayments of former borrowing; whatever outflow of capital might be conceded in ' private-capital-and-balancing-item' ; and the outflow involved in the reduction of sterling held by official institutions in non-sterling countries.

Repayments by the Government have been on a modest scale; and are not likely to be large enough in future to influence the non-sterling balance, though they will rise rather than fall as a result of the obligations arising from recent borrowing. It is difficult to be sure what will happen to private capital movements. It is unlikely that the genuine investment content of this item for 1950–52 or 1953–55 is very large. What is known of the size and direction of the balancing item suggests that there was a net inflow of private capital in 1946–49 (probably considerably larger than the annual £36 million shown for private-capital-and-balancing-item). In 1950–52, there was probably again a net inflow, but this time of much smaller dimensions. In 1953–55, there seems to have been little net movement at all, though a small outflow is perhaps more likely than an inflow. For most of the period then (i.e. up to 1952), private investment to and from non-sterling countries has helped rather than hindered the United Kingdom to balance her accounts. What might well have increased financing problems throughout this period are reductions in short-term credit (the polite name for ' hot money '). Even after averaging the figures for the three periods, there are unexplained net outflows (some of which however, may well be due to errors elsewhere). In 1953–55, it seems unlikely that the speculative outflow has continued, and it may well have been reversed.

The reductions in sterling holdings have often been made as a result of formal or informal agreements for their release, and are of the same nature really as other repayments of former Government borrowing. This might well be true of nearly all the net reductions up to 1952 (though it must be remembered that these figures also are affected by speculative buying and selling of sterling against other currencies). For the future, what happens to these figures must depend on that elusive element, confidence in sterling. Foreign-held reserves of sterling are much lower than they once were in relation to world trade. So long as sterling remains a well-used international currency the lower these are, the less likely is an outflow of serious dimensions over the years. Repaying accumulations of debt in the form of sterling balances is now a problem concerning the sterling area rather than the non-sterling world. It is short-term changes in confidence that create difficulties in the form of movements into and out of sterling balances. Nevertheless, too many shocks to confidence may well prolong into the future the general trend towards getting out of sterling.

We have also to consider the outer sterling area's relationship with the rest of the world. These countries contribute to building a surplus, or paying for a deficit, by sales of newly-produced gold in London, or by their surplus in other transactions with non-sterling countries. In the first post-war period, they actually added to the U.K.'s own drain, since annual gold sales of £72 million did not even finance their own deficit of £100 million a year. Since then gold sales and a net annual surplus on other transactions have been more than enough to balance that part of U.K.'s deficit not met by grants. By 1953–55, the outer sterling area's surplus was more than enough to meet the U.K.'s (much smaller) current deficit, without taking grants into account.

In 1950–52, other sterling countries contributed a net total of £294 million a year, and in 1953–55 of £198 million a year. The decline in the total surplus is notable enough. Leaving out gold sales, which increased from £83 million a year in 1950–52 to £131 million in 1953–55, the sterling area's surplus on other transactions fell from £211 million a year in 1950–52 to £67 million a year in 1953–55. This fall is somewhat exaggerated in that the division between periods at the end of 1952 is more appropriate to the U.K. than to some other sterling countries. The boom and slump in prices and trade following the Korean war were both rather more extended in time in these outer-sterling-area countries than they were for the U.K. However, any reasonable modification of the drop in net earnings between 1950–52 and 1953–55 which might be made could hardly remove a noticeable fall. This is an ominous though not unexpected development from the U.K.'s point of view. It means that greater efforts to squeeze the U.K.'s own current deficit, which will mainly have to be done by improving the trade balance, might have to be absorbed in replacing other sterling area earnings of foreign currency, rather than in stabilising the reserves, or beginning to lend again on any scale.

Capital transactions with non-sterling countries have not been of such dimensions that the conclusions already suggested need be modified. Speculative movements have been and could still be sources of great instability. But this is well-known to be true of any country's balance of payments; and for any country climbing unsteadily away from chronic deficits they have been and will be sources of great weakness. Apart from such considerations, the crucial developments in the United Kingdom's balance with non-sterling countries are still the trade balance and the outer sterling area's surplus.

Further comment on these two unknowns is best made in the light of transactions with the two main currency divisions concealed in the non-sterling world; the dollar areas, and O.E.E.C. countries (at present a sort of three-quarter-dollar area so long as deficits with E.P.U. have to be settled 75 per cent in gold). Table V shows the first of these, namely the United

Kingdom's balance of payments with dollar countries, in the same form as Tables I and IV.

One of the most striking trends to be seen in the figures for the dollar area is the steady reduction of the annual trade deficit, and of the current deficit. Both were by 1953–55 only about half their immediately post-war

TABLE V

*U.K. balance of payments with $ area 1946–55*
*(£ million, annual average)*

| **Current account** | *1946–49* | | *1950–52* | | *1953–55* | |
|---|---|---|---|---|---|---|
| Imports | 451 | | 596 | | 607 | |
| Exports | 155 | | 376 | | 450 | |
| Trade balance | | −296 | | −220 | | −157 |
| Shipping (net) | − 5 | | + 10 | | + 25 | |
| Interest, profits and dividends (net) | + 9 | | − 11 | | − 36 | |
| Travel (net) | + 2 | | + 18 | | + 29 | |
| Other (net) excluding gifts | − 43 | | − 76 | | − 41 | |
| Invisibles (net) excluding Government | | − 37 | | − 59 | | − 23 |
| Government: | | | | | | |
| Military, Administrative, diplomatic, etc. | − 1 | | − 1 | | + 21 | |
| Government (net) | | − 1 | | − 1 | | + 21 |
| Current balance of goods and services | | −334 | | −280 | | −159 |
| Migrants' funds, etc. | − 6 | | − 5 | | − 8 | |
| Government grants to U.K. | + 97 | | +150 | | + 66 | |
| Unilateral transfers | | + 91 | | +145 | | + 58 |
| Change in assets | | −243 | | −135 | | −101 |
| **Investment and financing account** | | | | | | |
| Government lending or borrowing | | +295 | | − 26 | | − 39 |
| Private capital and balancing item | | + 25 | | + 68 | | + 63 |
| Change in sterling holdings (of dollar countries) | | − 1 | | + 1 | | + 8 |
| Change in gold and dollar reserves | | + 39 | | − 19 | | − 33 |
| Net change on capital account | | +358 | | + 24 | | − 1 |
| Subscriptions to I.M.F. and I.B.R.D. (in gold) | | − 16 | | — | | — |
| Drawings from I.M.F. (in gold) | | + 19 | | — | | − 13 |
| Purchases of gold from R.S.A. | | + 72 | | + 83 | | +131 |
| Transfers from R.S.A.[1] | | −105 | | +103 | | + 47 |
| Transfers from O.E.E.C.[2] | | − 50 | | − 78 | | − 84 |
| Transfers from other areas[3] | | − 35 | | + 3 | | + 21 |
| Total investment and financing | | +243 | | +135 | | +101 |

[1] R.S.A. net surplus with dollar area +; net deficit −.

[2] Gold or dollar payments to O.E.E.C. countries by U.K. −; receipts by U. K. +.

[3] Gold or dollar payments to other countries by U.K. −; receipts by U.K. +.

size. It is almost inevitable that these two should move together, since the balance of invisible transactions with this area, whether good or bad, is comparatively small. However, it is always negative, so must not be neglected.

Of the four invisible items shown separately, two show steady progress, one steady decline, and one irregularity. The two showing steady progress are shipping and travel, both of which by 1953–55 were contributing creditable surpluses to the U.K.'s dollar balance. Unfortunately, the steadily deteriorating one, interest, profits, and dividends, worsened enough between 1946–49 and 1953–55 to absorb almost all the improvement in the progressing two items, and quite all of it between 1950–52 and 1953–55. The dominating item here is the interest paid on the U.S. and Canadian lines of credit after 1951. This accounts for —£26 million a year in 1950–52 and —£38 million a year in 1953–55. It is clear then, that apart from these payments, there was a marked deterioration here from 1950–52. The separate figures for payments and receipts of interest, profits and dividends, other than payments on previous Government borrowing are shown in Table VI.

TABLE VI

*Payments and receipts of interest, profits and dividends by U.K. to and from dollar area 1946–55*
*(£ million, annual average)*

| | *1946–49* | *1950–52* | *1953–55* |
|---|---|---|---|
| Payments (other than government) ... ... ... | −26 | −41 | −49 |
| Receipts ... ... ... ... ... ... ... | +35 | +56 | +59 |
| Interest, profits and dividends(net) ... ... ... | + 9 | +15 | +10 |
| (excluding Government payments) ... ... ... | — | — | — |
| Government payments ... ... ... ... ... | — | −26 | −46 |
| Interest, profits and dividends (net) ... ... ... | + 9 | −11 | −36 |

Between 1949 and 1950, receipts could be expected to increase in sterling value because of devaluation; payments would also have increased to the extent that they represent dollar rather than sterling obligations. This, no doubt, accounts for most if not all of the increase in both items between 1946–49 and 1950–52. After that, the increasing burden of paying for post-war borrowing from dollar sources is evident. In the years 1954 and 1955, non-Government payments were almost as big as receipts. This is a trend which can only be expected to continue: receipts cannot be expected to do more than cover outgoings on private investment, if that; while Government payments mean a substantial deficit. Moreover, Government payments will increase even more in the near future, as interest becomes due on the money recently borrowed to support the dollar reserves.

The remaining equivocal item is ' other (net )'. Once again, the dominant influence must be the activities of oil companies. Indeed they probably account for payments substantially larger than the deficits shown, since British insurance and other services included here must surely on balance earn income in dollar countries. What the future of this item might be (apart from the aftermath of Suez) can only be guessed. It seems doubtful that the deficit will be reduced much, since the value of all oil, including so-called sterling oil, has and is likely to have a dollar cost. Perhaps a cautiously optimistic guess for invisibles is that the deficit will remain of unimportant proportions.

Government expenditure cannot be divided with any accuracy into the two sub-items. What is shown though, is that receipts arising from defence programmes are enough, and recently considerably more than enough, to balance military and other Government expenditure. It seems most unlikely that military expenditure in dollars will be incurred in future, without receipts to balance it. It is not unreasonable to assume this. A pessimistic forecast then would be that non-military expenditure is no longer covered by receipts, and an optimistic one that a modest Government surplus continues. In either case relatively little contribution to or drain upon dollar resources is involved.

Among capital transactions, private capital is the most interesting, since it suggests the substantial scale on which private funds might have been moving into the United Kingdom. However, to trace any connection between this and the rising payments of interest, profits and dividends apparent after 1953, once more the balancing item must be estimated. Very little is known about the period 1946–49; but it is likely that private investment flowed into the U.K. to a greater extent than is shown by the composite item. In the two subsequent periods, the figures probably rather overstate the flow of investment. For all these uncertainties, it seems clear that there has been a sustained inflow, of a size great enough to be fairly important in helping to balance deficits elsewhere. Whether these will continue to be enough to cover heavier repayments due on Government borrowing is more doubtful.

The dollar payments and receipts involved in the United Kingdom's transactions with non-dollar countries are shown as transfers at the end of Table V. A mere glance at the size of the figures, whether positive or negative, will show their relative importance in determining the state of the reserves, and hence of confidence in sterling.

The dollar deficit of outer sterling countries in the immediately post-war years is familiar enough. But already by 1950–52, the sterling area's contribution to the gold and dollar reserves amounted to an annual £186 million, enough to cover a substantial part of the U.K.'s deficit, and considerably more than enough to cover that part of the U.K. deficit not covered by E.R.P. or defence aid grants. During this period, broadly speaking, the sterling area's surplus covered the U.K. net current deficit, after allowing for receipts of aid, plus U.K. Government repayments of former borrowing, plus annual additions to the reserve of £19 million.

In 1953–55, the sterling area's surplus was still £178 million a year, this time more than enough to cover the United Kingdom's deficit before counting aid. Once again, it is true that the United Kingdom's obligations to the dollar area—the current deficit, after allowing for aid, plus Government repayments both to U.S. and Canadian governments and to I.M.F.—and annual additions to the dollar reserve are fully accounted for in this way.

However, there was an important change in the composition of the sterling area's surplus between 1950–52 and 1953–55. In 1950–52, of a total surplus of £186 million a year, £103 million a year were the result of ordinary transactions, and £83 million a year the proceeds of sales of newly-mined gold. In 1953–55, of a total surplus of £178 million a year, no less than £131 million a year were the proceeds of gold sales in London, and only £47 million a year from other transactions. The whole of the increase consists of South African gold, sent to London in larger quantities as a result of negotiations between the United Kingdom and South African governments.

Breaking down the sterling area's surplus still further shows that the reason for its decline (apart from the proceeds of gold sales) is the appearance of a trade deficit between them and the dollar area for 1953–55 of £28 million a year instead of a surplus of £27 million a year in 1950–52. The surplus due to other transactions (including the income from tourists, and investment by dollar area residents) has remained steady in the two periods at something over £70 million a year. However, the figures for individual years show exceptionally high surpluses for 1952 and 1953. If these years are indeed exceptional, the annual surplus here may be little more than enough to balance the outer sterling area's trade deficit. The trade deficit itself seems hardly likely to disappear, since it is composed of a persistent deficit sustained by the independent countries on the scale of the United Kingdom's, together with a persistent but smaller trade surplus by the colonies.

TABLE VII

*Sterling area's balance with dollar area, 1950–55*
*(£ million, annual average)*

| | *1950–52* | *1953–55* |
|---|---|---|
| U.K. trade balance ... ... ... ... ... ... ... | −220 | −157 |
| Colonies' trade balance ... ... ... ... ... ... ... | +131 | + 83 |
| Other sterling countries' trade balance ... ... ... ... | −104 | −111 |
| Sterling area trade balance ... ... ... ... ... ... | −192 | −185 |
| U.K. invisibles (including Government) ... ... ... ... | − 60 | − 2 |
| Other transactions of overseas sterling countries (including capital movements) ... ... ... ... ... ... ... | + 76 | + 75 |
| Balance of above ... ... ... ... ... ... ... ... | −176 | −112 |
| Gold sales ... ... ... ... ... ... ... ... | + 83 | +131 |
| Balance (to be financed by U.K. capital transactions from reserves, or by transfers) ... ... ... ... ... ... ... | − 93 | + 19 |

The whole sterling area's balance with the dollar area for 1950–52 and 1953–55 is shown in Table VII.

In both the later periods, the main reason for the United Kingdom's continuing dollar stringency, in spite of all this, can be found in the considerable and persistent dollar payments to O.E.E.C. countries. The 1946–49 payments of £50 million a year are not surprising, nor very large in relation to other payments figures. But these payments have grown steadily larger, to £78 million a year in 1950–52, and to £84 million a year in 1953–55. Already by 1950–52, they were large enough to absorb an amount greater than the net inflow of dollars for investment (including unidentified short-term movements). By 1953–55, they were greater than the inflow of investment and greater than the total grants from the U.S. government. Moreover, mostly because of the reduction in the sterling area surplus, dollar payments to O.E.E.C. countries were greater by about £16 million a year than the dollar earnings of the sterling area, and of the U.K. with other countries, put together.

The United Kingdom's balance of payments with the dollar area is the most paradoxical one in that it shows at once the clearest trend of improvement, and the most alarming signs of possible future weakness. The trade balance has improved unequivocally, even with some relaxation of import controls in the latest period. The invisible balance may not improve, but the deficit involved is likely to be small. No substantial Government expenditure is at all likely to make matters worse. Even the continuing necessity for the Government to meet its obligations arising from past borrowing does not seem a particularly crushing burden, bearing in mind the continuous inflow of investment funds. The alarming trends are chiefly two. There is the ever-growing dollar deficit as a result of transactions with O.E.E.C. countries; and secondly there is the greatly increased dependence on South African gold to finance the deficit.

To complete the survey, it is necessary to examine in more detail the separate balance with O.E.E.C. countries. This is shown in Table VIII in the same form as in the preceding tables. The first obvious difference between this table and the preceding ones is that the balances, either positive or negative are small. They therefore look less serious, especially since they are based on a much larger volume of trade than with the dollar area. Even in 1950–52, the only one of the three periods when there has been an annual deficit, it was only £69 million a year, and the total net deficit on current account including grants only £70 million a year. In both the other two periods, there was a trade surplus, and a small surplus on current account. The modest looking average figures conceal some much sharper deficits and surpluses for individual years, which have been influenced by successive liberalisation of trade, punctuated by temporary reversals. The deficits create acute difficulties when they occur, notably in 1951 and 1955. But the purpose of this analysis is to try to find a normal longer-term balance, about which the short-term changes take place. It is only in the detailed items that the sources of weakness to the United Kingdom become clearer.

There is no clear trend to be observed in the trade figures. This is not surprising since the second and third periods are affected by the policy of liberalisation of trade, which has itself not been pursued without setbacks.

TABLE VIII

*U.K. balance of payments with O.E.E.C. countries*
*(£ million, annual average)*

| **Current account** | *1946–49* | | *1950–52* | | *1953–55* | |
|---|---|---|---|---|---|---|
| Imports ... ... ... ... | 295 | | 744 | | 773 | |
| Exports ... ... ... ... | 334 | | 675 | | 791 | |
| Trade balance ... ... ... | | +39 | | −69 | | +18 |
| Shipping (net) ... ... ... | + 1 | | − 14 | | − 24 | |
| Interest, profits and dividends (net) ... ... ... ... | −15 | | − 13 | | − 10 | |
| Travel (net) ... ... ... | −21 | | − 30 | | − 38 | |
| Other (net) excluding gifts ... | +46 | | +109 | | +110 | |
| Invisibles (net) (excluding Government) ... ... ... | | +11 | | +52 | | +38 |
| Government: | | | | | | |
| Military, Administrative, diplomatic, etc. ... ... | −10 | | − 18 | | − 30 | |
| Government (net) ... ... | | −10 | | −18 | | −30 |
| Current balance of goods and services ... ... ... ... | | +40 | | −35 | | +26 |
| Migrants' funds, etc. ... ... | — | | − 3 | | − 2 | |
| U.K. government grants to O.E.E.C. countries ... ... | −22 | | − 32 | | — | |
| Government grants to U.K. ... | — | | — | | — | |
| Unilateral transfers ... ... | | −22 | | −35 | | − 2 |
| Change in assets ... ... ... | | +18 | | −70 | | +24 |
| **Investment and financing account** | | | | | | |
| Government lending or borrowing | | −27 | | +16 | | +23 |
| Private capital and balancing item | | − 9 | | −55 | | −57 |
| Change in £ holdings (of O.E.E.C. countries) ... ... ... | | + 1 | | −39 | | − 8 |
| Change in reserves of O.E.E.C. currencies ... ... ... | | − 7 | | − 5 | | + 9 |
| Change in E.P.U. credits or debits | | — | | +72 | | −33 |
| Net change in capital account ... | | −42 | | −11 | | −66 |
| R.S.A. surplus (+) or deficit (−) | | —[1] | | +79 | | +35 |
| Transfers in gold and dollars ... | | +50 | | +78 | | +84 |
| Transfers in other currencies ... | | −26[1] | | −76 | | −77 |
| Total investment and financing ... | | −18 | | −70 | | −24 |

[1] R.S.A. balance included with 'other currencies' for 1946–49.

Nevertheless, there is no particular cause for anxiety when a small surplus is produced on average for 1953–55 on an increasing flow of trade. But what would happen after a major change of policy, such as joining a free-trade area, is another matter.

The figures for invisible transactions are not so satisfactory. Taken together they produce a surplus, which has at least not been falling over the period, though it has not been consistently rising either. This is still true if Government transactions are included. However, three items, shipping, travel and Government have been clearly deteriorating. Shipping services (dry cargo only) cost £24 million a year in 1953–55, more than enough to swallow up the trading surplus. Net expenditure on travel was even higher: £38 million a year in 1953–55. Neither of these items can be expected to decrease much in future. No doubt the increased expenditure on shipping is partly a reflection of the post-war rehabilitation of Europe's merchant fleet. But there is little reason to foresee the end of increasing activity here. Nor is expenditure on holiday and other travel in Europe likely to decrease in the absence of fresh controls. On the contrary, increasing incomes in the United Kingdom and closer political associations with European countries are only two future developments likely to increase it. However by 1953–55, net earnings from other transactions, again mainly oil sales, were still quite large enough to pay for the net deficits on all other invisible transactions, and leave enough over to pay for the Government's activities as well. Further increases here can be expected, as Europe's oil consumption goes up; and this possibility might be taken to outweigh the gloomy outlook for other invisible transactions.

The other important factor in keeping the current surplus so small in 1953–55 was Government expenditure. Net expenditure has increased markedly, from £10 million a year in 1946–49, to £18 million a year in 1950–52, to no less than £30 million a year in 1953–55. Bearing in mind the modest dimensions of the surpluses elsewhere, continuing expenditure on this scale is bound to alter the look of the current balance seriously.

Far more of the explanation of past weaknesses, and perhaps warning of future ones, lies in the investment and financing account. In 1946–49, there was a considerable annual capital outflow, most of it being in the form of Government loans soon after the war. Indeed Government loans and grants together in this period covered rather more than the annual current surplus of goods and services (£49 million a year given or lent, against an annual surplus of £40 million). The most serious problem for the United Kingdom is not to be found here at all among the direct U.K./O.E.E.C. transactions, but among the transfer items at the bottom of the table. No less than £50 million a year in gold or dollars were paid to O.E.E.C. countries, in spite of there being only the smallest of deficits on the total U.K./O.E.E.C. account.[1] Concerning gains or losses by transfers between O.E.E.C. and other non-dollar areas, we know only that the net result was an additional outflow of £26 million a year. However, it is most likely that this was made up of a net surplus in outer sterling area countries' dealings with O.E.E.C. countries

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[1] The *loss* of £50 million a year is shown in the table as + because the balance of payments accounts are drawn up in terms of the particular currency of each area shown. Having to pay some O.E.E.C. countries in gold or dollars instead of in some European currency (or £) is regarded as a sort of gain of European currency which would otherwise have been paid. All ' gains ' (+) of this kind under transfers represent equal losses of other currencies (in addition to any losses which might have been incurred in direct U.K. transactions with these.) Similarly ' losses ' (−) among the transfers represent payments (or sales) of European currencies to other currency areas, over and above those required to finance direct U.K./O.E.E.C. dealing.

(accounting for an additional gain of O.E.E.C. currency) and a net loss of O.E.E.C. currencies to non-sterling, non-dollar countries.

In the two later periods, Government capital transactions and inter-area transfers are still important; but two other items also must be considered: private capital movements, and the use of credits in the European Payments Union.

If the 'balancing item' were removed from the figures it seems unlikely that there was an outflow of private investment in 1946–49, certainly not on a considerable scale, and perhaps even a net inflow. In 1950–52, there was a net outflow of investment, though probably not of the order of £55 million a year as shown. In 1953–55, the net outflow must have been larger than in 1950–52, though it still may not have been quite as large as £57 million a year. Almost certainly then, there has been a continuously growing volume of private investment from the United Kingdom in O.E.E.C. countries (including their dependencies), and the outward flow of funds was probably considerably increased by movements of short-term credit in 1950–52, and perhaps somewhat increased in 1953–55. The figures for sterling held by official institutions in O.E.E.C. countries bear this out. There is here no question of blocked balances to confuse the issue. The sharp fall of £39 million a year in 1950–52, and the more modest fall of £8 million a year in 1953–55 are probably part of the persistent speculative movements away from sterling in this period.

The use and replacement of E.P.U. credits has also been important in financing the U.K.'s transactions with O.E.E.C. countries. In 1950–52, an average of £72 million a year of credit was used, enough to finance the annual current deficit and U.K. grants to O.E.E.C. countries, which together came to £70 million a year. The 'price' of this facility was a loss of gold and dollars at the rate of £78 million a year for 1950–52 (practically all of it being in fact paid after E.P.U. started operations in July 1950). This sum is just equal to the net annual deficit in this period due to Government and private capital transactions and the reduction of sterling balances held by O.E.E.C. countries. It is also almost exactly equal to the outer sterling area's surplus with O.E.E.C. countries; but this surplus was 'absorbed' by an equivalent loss of O.E.E.C. currencies to other non-sterling, non-dollar countries.

In 1953–55, the investment and financing account looks even more depressing. Although the U.K. managed to reduce its debt to E.P.U. by £33 million a year, net annual payments of gold and dollars had risen to £84 million a year. Only one seventh of this was due to transactions with E.P.U. From current settlements, £4 million a year of gold was received; while £16 million a year was paid under bilateral settlements arising from past debts to E.P.U. There remains no less than £72 million a year of net losses of gold and dollars due to transactions with O.E.E.C. countries, outside E.P.U. settlements. Exactly what these payments are is not known; but these are undoubtedly the price of allowing greater freedom for using sterling in settling international transactions. For instance, U.K. merchants may buy certain commodities for dollars and sell to non-dollar, non-sterling countries for sterling or other non-dollar currencies. The number of such commodities was increased in 1955, so these transactions, and the dollar drain they cause, must still be continuing. The dollar cost of the U.K.'s support of sterling in the markets for transferable sterling would also be included here.

Outer sterling area countries have a surplus with O.E.E.C. countries to add to U.K.'s resources; though in 1953–55 this had fallen to £35 million a year, less than half the level of 1950–52. For this particular item, it is more likely that the 1953–55 figure is representative of the general level of the sterling area's surplus which may be expected to persist in normal times. The trade surplus in the year 1950 was remarkably high; but leaving out 1950 altogether, the trade surplus for outer sterling area countries for 1951–52 was £74 million a year, as it was also for 1953–55. Other transactions between these countries (that is, invisible current transactions and capital transactions together) account for a deficit or net outflow of some £40 million a year, a level fairly consistently maintained.

In 1953–55 also, the loss (or sale) of O.E.E.C. currencies to meet the U.K.'s requirements in non-sterling, non-dollar countries was again heavy, amounting to £77 million a year, almost the same as in the previous period.

In general terms, it seems that the 1953–55 figures may be typical of what can normally be expected in U.K. balance of payments with O.E.E.C. countries, assuming no major changes of policy. Taking other sterling area transactions into account as well, a summary of the sort of balance to be reached, might be as follows. Both the U.K. and other sterling countries have on balance a trade surplus, though for U.K. this is a far less stable one than that of R.S.A. On average this should amount to getting on for £100 million a year. In addition, the U.K. alone earns a fairly constant surplus on invisible transactions, almost all of which might be needed to pay for Government commitments. About half the remaining trade surplus is needed to meet R.S.A. payments for services or other transactions, leaving a comfortable if modest surplus of some £50 million a year. But this is of the same order of magnitude as the outflow for private investment, though this has been partly offset, and may still be, by Government receipts from repayments of former loans. There is then no good reason in normal direct transactions with these countries for the persistent heavy strain on the reserves through gold and dollar payments to them. The policy of freeing commodity markets is clearly an expensive one in terms of dollars. In what respect if any, the balance of payments could be said to be strengthened elsewhere by enhanced freedom for sterling is not clear. It has certainly not yet induced non-sterling countries to hold more sterling on average, though the rate at which they have been getting out of sterling was somewhat lower in 1953–55 than it was in 1950–52. Whether this must be assumed to continue is not subject to statistical analysis; but if it does, it seems a somewhat questionable use of scarce resources.

It now remains to draw what general conclusions may be justified about past achievements and future prospects. So far as the past is concerned, in the pre-Suez era enough progress had been made in reducing deficits and increasing earnings that the United Kingdom and the sterling area as a whole had reached a sufficient, though not altogether comfortable balance in overseas transactions. The United Kingdom was already in a position, taking one year with another, to provide a useful if not spectacular flow of investment for overseas development. The flow had already reached such proportions that an aim of 1 per cent of the national product for underdeveloped areas looked not at all impossible, even with continuing military commitments.

The prospects for the future, looking from the end of 1955, looked reasonably good. The improvements in the balance of payments had been achieved by means most of which might be expected to continue. The most important conditions on which they would do so, would be that imports were prevented from rising faster than exports; that net earnings from oil sales continued to increase; and that the outer sterling area's net trade surplus did not fall, or worse still disappear. So far as these conditions are not fulfilled, the greater will be the effort required from the United Kingdom to replace whichever of the three is lost, as well as meeting its international commitments.

Assuming these conditions are fulfilled, the dollar balance is still likely to be the most precarious of all. Whether it might be expected to show a worsening trend again over a period of years seems to depend on two further conditions. These are that South African gold continues to be sold in London in quantities at least as great as those of more recent years; and that the recent sharp increases in losses of gold or dollars through commodity markets, and through sales against transferable sterling should be at least not allowed to get worse.

Fulfilling all these conditions would not be enough to bring such a state of calm that Chancellors may forget the balance of payments, or even cease to be haunted by it. All of the foregoing has been in terms of annual averages, the purpose of which is to remove the effects of short-period fluctuations. But it is those very fluctuations which bring about sudden outflows of the reserves, which are the essence of balance of payments crises. Nevertheless, long-term policies in this field ought to be formulated; and this can only be done in relation to longer-term trends. Moreover, the right policy to deal with another crisis of a purely temporary kind, which arises in spite of an underlying balance, would not necessarily be the right one to deal with a crisis which is a symptom of underlying deficiency.

Up to 1955, the improvements in the balance of payments were accompanied in each period by rising production. In the first period the increase in the gross domestic product (in real terms) was some 3 per cent a year, in the second about 2 per cent a year, and in the third about 4 per cent a year. What is a desirable, or possible, annual increase in production to aim at in future, goes far beyond the bounds of this paper. But that there should be *some* annual increase in production, of an order comparable with our own with past performance and with the current and likely future achievements of other industrialised countries is a reasonable condition of improvement. During the decade here reviewed, this condition was satisfied. But such evidence as there is of developments after the end of the period are not so promising. In 1956, the balance of payments taken by itself looks greatly improved: the details of the ' improvement ' and the background on which it took place are disturbing.

The balance of trade was much improved in 1956, compared with 1953–55, to the tune of £200 millions. But this was achieved at the expense of a cessation in the increase in national production, and was accompanied by deliberate and partially successful Government policies to restrain investment, to reduce that is, the capacity for future improvements. Other items in the current balance do not look particularly impressive. Invisible earnings were no more than in 1953–55, even after crediting them with the £37 millions instalment due on the American and Canadian loans, but not paid. Government expenditure was noticeably more than in 1953–55, after taking account of greater receipts. Transfers are now a negative item, and will probably continue so, since defence aid is tailing off. Investment and financing tells a dismal story. Capital outflow on Government and private account was maintained, and long term capital investment rather more than the 1953–55 average. But this was accompanied by a serious reduction in overseas holdings of sterling (not far off the amount of long-term investment). Moreover the dollar reserves were only maintained by borrowing from the I.M.F.; that is by increasing the prior claims on our overseas earnings in the near future.

' Improvement ' in the balance of payments in 1956 was somewhat equivocal, even in the too-narrow sense of the balance of payments White Paper alone. When it is remembered that even this was achieved at the expense of any increase in production—and admittedly and deliberately so—it can hardly be called an improvement. For signs of future progress the U.K. balance of payments white papers will have to be read with the national income blue books, if not with United Nations statistics as well; for without them they will make little sense.

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# CHANGES IN STOCKS OF MAINLY IMPORTED GOODS IN THE UNITED KINGDOM

### *By* M. FG. SCOTT

The purpose of this note is to present some estimates of changes in stocks of mainly imported food and materials in the United Kingdom during the post-war period. The extent to which the irregularities in the volume of imports are smoothed out when changes in these stocks are taken into account, and their rôle in the various balance of payments crises are briefly examined.

## *Description of the estimates*

' Mainly imported goods ' is a vague concept, and there is no single best solution to the problem of deciding what goods to include or how they should be valued. The two questions mentioned above suggest rather different groupings. Since the estimates were prepared as part of a wider study of the behaviour of imports[1] they were designed for the special purposes of that study. The nature of the available statistics also limited what could be done.

For certain kinds of industrial materials it is interesting to relate the volume of imports to the volume of the output of the industries using them, and it is proposed to do this in the study mentioned above. The materials chosen are those of which the great bulk of our supplies are imported: rubber, cotton, wool and softwood are obvious examples. If only a small fraction of our supply of any particular material is produced at home, imports of the material *less* any increase (or plus any decrease) in its stocks will approximately equal the input of the material into industry. If there are no close substitutes for the material, changes in input will be closely related to changes in the output of the industries for which the material is an important input. Thus raw cotton imports adjusted for changes in raw cotton stocks are likely to change in much the same proportion as the output of the cotton spinning trade.

Estimates of stocks are published only for the main industrial materials, and this limits the coverage of the stocks figures. The coverage is further limited by the fact that, even for the materials included, some stocks held in this country are not recorded in the statistics. Altogether 38 separate published series were used, and these are listed in the Appendix. Iron and steel and coal were excluded, both from imports in the study mentioned and from stocks, on the grounds that the main part of our supplies are produced in this country. Imports of these materials are marginal, and fluctuate in a way which is not at all closely related to industrial production. A major exclusion was petroleum, for which no stocks figures are published.

The estimates of food stocks were prepared with a rather different purpose, namely, to obtain an estimate of consumption of food measured at an early stage in the production and distribution process. Consumption was derived from the sum of home production and imports, less certain exports and less the increase (or plus the decrease) in stocks of mainly unprocessed food. For this reason the stocks figures include such items as meat and barley, despite the fact that a large part of our supplies of these goods is produced at home. For most of the goods included, however, it is true to say that by far the greater part of our supplies is imported. These estimates were made with the help of the Ministry of Agriculture, Fisheries and Food, to whom many thanks are due.

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[1] This study, in turn, is part of an inquiry by the National Institute of Economic and Social Research into the behaviour of the British economy in the post-war period.

In most cases the change in stocks of materials was obtained as the difference between stocks as recorded in the published statistics at the end of each successive year; but where there was an important break in the series due to the exclusion of Government stocks, stock changes were calculated as a residual from production plus imports less exports and less consumption. Thus, in principle, changes in government held stocks (commercial and strategic) are included in the present estimates.

The changes in physical units of the various commodities were multiplied by the average values of similar imports, and so the total value of the physical change in all stocks, or in any group, could be obtained. Two sets of estimates were made. In the first (Part A of Table 1) the changes in every year for each good were multiplied by the average value of the similar import in 1948. This procedure yielded an estimate of the value of the physical change in stocks at constant 1948 prices. The year 1948 was chosen because this is the base year for official estimates of production and expenditure at constant prices in the Blue Books of National Income and Expenditure. In the second set of estimates (Part B of Table 1) the changes in each year were multiplied by the corresponding average value for that year, and so an estimate of the value of the physical change in stocks at current prices was obtained. It will be noted that neither of these estimates includes any element of stock appreciation.

This completes the description of the main features of the estimates. The sources used, and further details of a more technical interest, are given in the Appendix. The estimates themselves are shown in the Table 1.

### *The fall in stocks since the war*

The estimates given here suggest that there has been a large fall in stocks of mainly imported goods since the war, amounting to some £150 millions at 1948 prices. The 'empty economy'[1] of the early post-war years was not empty of these goods. Even in 1947, after the heavy reductions of the previous year, stocks were higher in relation to production than they have been in recent years. Nor were stocks of other goods *generally* low in relation to total production. Subtracting the estimates given here from the estimates of total stocks given in the Blue Book of National Income and Expenditure, it seems that stocks of other goods and work in progress increased roughly in line with the gross domestic product from 1946 to 1955.

[1] See 'The Empty Economy' by Professor J. R. Hicks, *Lloyds Bank Review*, July 1947.

### TABLE I

*Value of the physical change in stocks of mainly imported goods.*

| | *Value of stocks end 1945* | *£ millions* | | | | | | | | | | *Total change* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *1946* | *1947* | *1948* | *1949* | *1950* | *1951* | *1952* | *1953* | *1954* | *1955* | *1946–55* |
| *A. At constant 1948 prices:* | | | | | | | | | | | | |
| Food and tobacco ... ... ... | — | −68 | −13 | 41 | 45 | −61 | 20 | 16 | 46 | −63 | −25 | −63 |
| Of which, tobacco ... ... ... | *42* | *16* | *0* | *1* | *4* | *4* | *8* | *−10* | *3* | *2* | *6* | *34* |
| Non-ferrous ores and metals ... ... | 50[1] | −22 | −4 | 3 | 9 | −10 | 3 | 7 | 11 | 1 | −1 | −2 |
| Textile materials and hides and skins... | 249 | −28 | −18 | −40 | 0 | −22 | −9 | −7 | −4 | −8 | −14 | −149 |
| Of which, hides and skins ... ... | *8* | *−1* | *3* | *−3* | *−1* | *0* | *0* | *−3* | *1* | *1* | *−2* | *−4* |
| Other materials ... ... | 69 | −4 | 23 | 5 | −9 | −20 | 41 | 2 | 3 | 0 | 18 | 58 |
| Of which, timber ... ... ... | *40* | *−14* | *29* | *−2* | *−4* | *−15* | *24* | *−1* | *6* | *−2* | *8* | *29* |
| paper-making materials ... | *14* | *−3* | *−1* | *7* | *−1* | *−4* | *7* | *2* | *−2* | *−1* | *5* | *9* |
| rubber ... ... ... | *11* | *15* | *−6* | *−1* | *−4* | *0* | *8* | *−1* | *1* | *1* | *4* | *18* |
| **Total** ... ... ... ... ... | — | **−122** | **−12** | **9** | **45** | **−113** | **55** | **18** | **56** | **−70** | **−22** | **−157** |
| *B. At current prices* | | | | | | | | | | | | |
| Food and tobacco ... ... ... | | −44 | −5 | 41 | 50 | −62 | 27 | 20 | 59 | −54 | −35 | −3 |
| Non-ferrous ores and metals ... ... | | −15 | −3 | 3 | 12 | −13 | 8 | 20 | 23 | 2 | −1 | 35 |
| Textile materials and hides and skins ... | | −20 | −9 | −40 | 0 | −42 | −36 | −4 | 6 | −9 | −14 | −170 |
| Other materials ... ... ... ... | | 4 | 23 | 5 | −9 | −19 | 83 | 4 | 5 | 0 | 28 | 124 |
| **Total** ... ... ... ... ... | | **−75** | **5** | **9** | **52** | **−137** | **82** | **39** | **93** | **−61** | **−22** | **−14** |

[1] Excluding aluminium, which is included in the estimates of changes in stocks.

*Note.* Detail may not add to totals because of rounding.

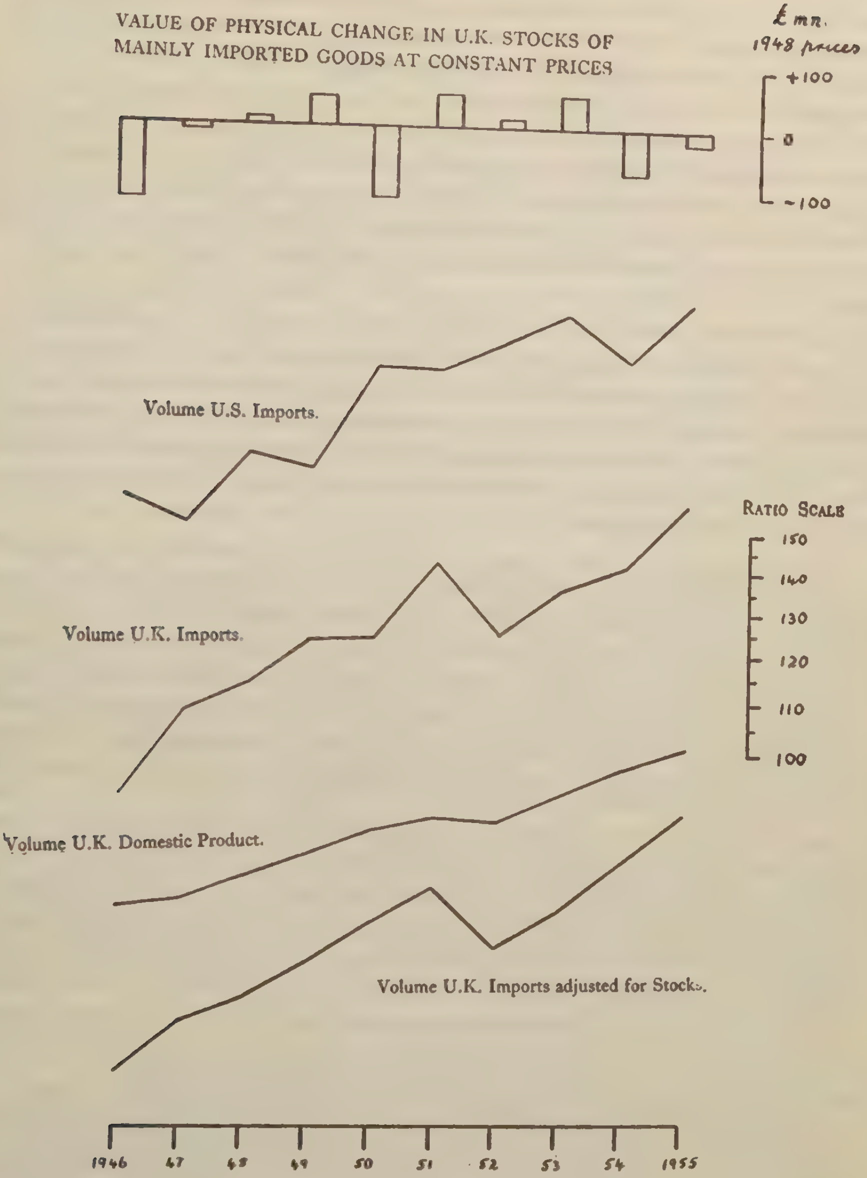
Stocks of particular materials were low. Inadequate coal stocks were largely responsible for the fuel crisis in 1947. Amongst the mainly imported goods, as may be seen from the table, stocks of food and textile materials were high, the latter extraordinarily so, while stocks of tobacco, timber and woodpulp were relatively low. There was this imbalance, but, apart from the coal shortage, it seems likely that the explanation of the apparent emptiness lay in the high demand for stocks rather than in the low supply. A high level of stocks has been associated with Government trading in food and materials, and in times of shortage businessmen tend to hoard materials, and maintain stocks at levels which they would regard as excessively high in normal times.

### *Changes in stocks and fluctuations in the volume of imports*

The United Kingdom imports a very wide variety of goods which enter the economy at all stages in the economic process. Hence one might expect that the volume of imports would change in something like the same proportion as total production. A more stable relation between the two is found if we adjust the volume of imports for changes in stocks of mainly imported goods, and so compare changes in imports less any increase (or plus any decrease) in these stocks with changes in total production. We have already seen that this adjustment is likely to improve the relation between the imports of any mainly imported material and the output of the industries for which it forms an important input. The relation of food imports to food consumption is also improved in this way. Home food production tended to change in line with food consumption and neither fluctuated very much during the post-war period. Hence changes in stocks of food were reflected in food imports, and the latter are smoothed by adjusting for the former. If we now add together the imports of materials and food and all other imports on the one hand and compare them with the sum of all outputs on the other, we may still expect the adjustments for stocks to remove some of the irregularity in the relative movements of these two totals. We may also hope for some cancelling out of other factors which would tend to cause irregularities, such as the substitution of one imported material for another, or unrecorded stock changes. But changes in the composition of output, fluctuations in imports of steel or other manufactures which are only marginally supplied from abroad, and many other possible causes of instability would remain.

As it turns out, the development of the volume of imports after adjustment for stocks is considerably smoother, and so more like that of total production, than is the development of unadjusted imports (see Figure 1). It would be out of place here to seek to explain the faster increase in imports than production over the period as a whole, and the much sharper fall in 1952. One might be tempted to conclude that the British economy's marginal propensity to import is greater than its average, but it is as well to remember that there was a relaxation of import controls throughout most of this period, and a tightening of them in 1952. The recession in 1952 also happened to

FIGURE 1



VALUE OF PHYSICAL CHANGE IN U.K. STOCKS OF MAINLY IMPORTED GOODS AT CONSTANT PRICES

affect particularly textiles and paper, both industries with an unusually high import content of output. There were, of course, many other factors at work as well.[1]

We ran down our stocks of mainly imported goods in 1946 and 1950, and piled them up in 1949 and 1951. The stock reductions in 1946 and 1950 were at the time officially attributed to shortages abroad.[1] It is possible that such changes in ' availabilities ' were connected with swings in United States imports. To quite a large extent this country and the United States are competing for the same goods abroad; and in the early part of the period, when primary commodities were in short supply, there was something of an inverse relationship between our imports and theirs (Figure 1).[2] Even if this relationship was more than coincidental it is not clear what was cause and what was effect; and there are, of course, other large importers of primary products which should be brought into the analysis.[3]

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[1] It is proposed to examine some of these factors in the writer's study of imports referred to above.

### *Changes in stocks and the balance of payments*

The balance of payments on current account gives a measure of a country's net acquisition of foreign assets. An increase in stocks of mainly imported goods can be regarded as equivalent in many respects to an increase in foreign assets. Hence we might measure a country's current balance by the sum of the balance as conventionally defined and investment in stocks of mainly imported goods.

It is important to realise that the interest of this measure largely depends upon the fact that foreign assets are not easily substitutable for domestic assets, but *are* for these particular assets, the stocks of mainly imported goods.[4] We could on these lines make out a good case for including other changes in stocks. For example, over virtually the whole period both steel and coal were in short supply, and we imported and exported both goods. An increase in steel or coal stocks was obtained at an equivalent cost in foreign exchange (since the steel or coal might otherwise have been exported, or imports might have been lower), and enabled an equivalent net addition to our foreign exchange earnings to be made in some future period.[1]

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[1] See the *Economic Survey for 1947*, Cmd. 7046, para. 38 ' imports did not rise as fast as had been expected, for we had to contend with serious world shortages of food and raw materials ', and the *Economic Survey for 1951*, Cmd. 8195, para. 95 ' This growing scarcity of non-dollar supplies of raw materials . . . has been primarily responsible for the reduction in domestic stocks which took place in 1950. For while in the early months of the year restrictions were placed on dollar purchases of some raw materials on grounds of dollar economy, these were relaxed later on, and during most of 1950 no such restrictions applied to purchases of essential raw materials. The decline in stocks was therefore almost entirely due to other factors'.

[2] It is interesting, and perhaps surprising, to note that the proportionate fluctuations in our imports since the war have been about the same as those of the United States. Since our imports were only about 15 per cent smaller on average, the absolute size of the fluctuations in our imports was not very different from that of the United States.

[3] It might for instance be suggested that the United States imports were the active factor and United Kingdom imports the passive result. But it is not very clear why it should be this country which went short in the scramble for supplies, unless it is to be supposed that our purchasing policy was less determined than that of other countries.

[4] For this reason it is not very satisfactory to compare changes in *all* stocks in the United Kingdom with the current balance of payments, as was done, for example, by Sir Henry Clay in 'A Note on Stocks ', *The Journal of Industrial Economics*, Vol. 2, April 1954, pp. 86–87. It is true that all stock changes have some impact on the balance of payments, but then so do changes in fixed investment, or consumers' expenditure. What seems incorrect is to regard the value of the physical change in all stocks as *equivalent* to a similar change in foreign assets. Such a procedure would be valid if resources were very mobile and substitutable for each other. But in these circumstances the character of the balance of payments problem would be very different. Nevertheless, stocks of more commodities than those which are mainly imported are relevant, as is pointed out in the text.

Figure 2B shows the result of adding investment in stocks of mainly imported goods (at current prices) to the United Kingdom's balance of payments on current account. As with the volume of imports, the progression of the figures is somewhat smoothed by this procedure. The deteriorations in 1947, 1951 and 1955 become less sharp. 1950 and 1954 look less favourable. 1949, the year in which sterling was devalued, has a small surplus.[2]

Since our foreign exchange crises have mainly taken the form of a drain on our gold and dollar assets, in Figure 2A a similar adjustment is performed on the figures of our gold and dollar balance. This balance measures the net change in the United Kingdom's gold and dollar reserves less any drawings on the American Loan or receipts from Marshall Aid or other extraordinary sources of finance. From 1953 onwards it is simply the change in the reserves. The swings in this balance were greater than in the current balance of payments, and so the effect of the adjustment for stocks is relatively smaller. It is still true, however, that the adjustment smooths out the changes to some extent.[3]

Two conclusions may be drawn from all this. First, taking changes in stocks of mainly imported goods into account does not greatly alter the behaviour of the United Kingdom's balance of payments in this period. As may readily be seen from Figure 2, the movements of the unadjusted and adjusted series are broadly the same. 1947, 1951 and 1955 remain 'bad' years. The crisis in 1949 was not so much due to a *worsening* in that year as to the continuance of an unfavourable position, and this remains after our adjustments. Second, the effect of the changes in stocks was, up to 1951, generally to make the position look worse when it was already bad, and better when it was already quite good. In this sense the stock changes were a destabilizing factor. Since capital movements could never be fully controlled, so that it was important how the balance of payments situation looked, and since imports for most of this period were fairly tightly controlled, and a large part of the stocks were in Government hands (or closely controlled), it may be asked why the stock movements took this form.

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[1] Indeed, so valuable were steel and coal in the bilateral trade bargaining of the time that we might reasonably value them at more than their current market value abroad, and certainly at more than their domestic market value.

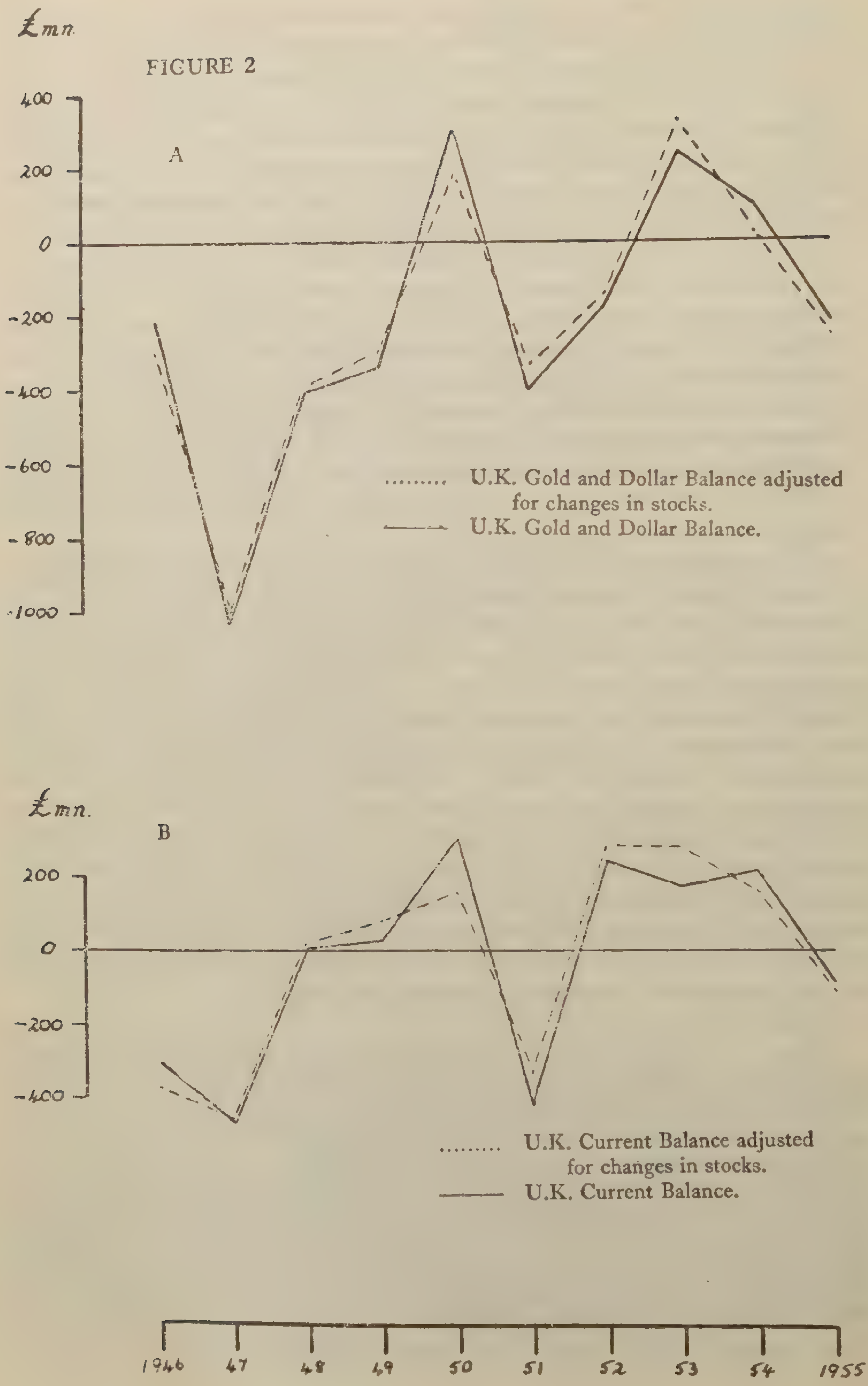
[2] Emphasis is given in the text to the effect of stock changes on the size of *changes* in the balance of payments. It is also true that stock fluctuations made the surplus or deficit more extreme in 1950 and 1951, though not in 1952 or 1953.

[3] Since we are adjusting the *gold and dollar* balance for changes in stocks, it might be thought preferable to exclude from the latter any change in stocks of goods mainly imported from the sterling area, on the grounds that they were not readily substitutable for gold and dollars. Whether this is true or not, the following figures for the current values of the physical change in stocks of the main sterling area materials suggest that the adjustment would not be very different. The materials included are zinc concentrates, wool, jute goods, hard hemps, goat- and sheepskins and rubber.

£ millions.

| *1946* | *1947* | *1948* | *1949* | *1950* | *1951* | *1952* | *1953* | *1954* | *1955* |
|---|---|---|---|---|---|---|---|---|---|
| 6 | —10 | —16 | —9 | —41 | —6 | 22 | 17 | 3 | 11 |

FIGURE 2


£mn.
400
200
0
-200
-400
-600
-800
-1000
A
........ U.K. Gold and Dollar Balance adjusted for changes in stocks.
——— U.K. Gold and Dollar Balance.
£mn.
B
200
0
-200
-400
........ U.K. Current Balance adjusted for changes in stocks.
——— U.K. Current Balance.
1946
47
48
49
50
51
52
53
54
1955

It is convenient to consider at this point an explanation which has been suggested by some writers for both the recurrent balance of payments crises and the swings in imports and in investment in stocks.[1] It is suggested that the sterling area faced a crisis in each of the odd years 1947, 1949 and 1951, that during each crisis severe import cuts were imposed which, however, operated with a lag, so that their main effect was felt in the following year. In these even-numbered years (1948, 1950, 1952) imports were therefore low and stocks were run down. The resulting favourable payments position, together with the need to replenish stocks, led to some relaxation of import restrictions which took effect in the following odd-numbered years. In those, imports were higher and stocks were built up, and this helped to cause a crisis. None of the authors mentioned regards this as the *sole* explanation of the crises, but both Katz and Fleming imply that it was a very important one.[2] An unfortunate result of this mechanism, so it is suggested, is that we tended to build up stocks when prices were high and reduce them when prices were low. This was because the good years (when stocks were run down) also happened to be the years when prices were low.

It is worth noting that, although there were crises every two years up to 1951, there was no two year cycle in the gold and dollar balance or in the current balance. A glance at Figure 2 shows that, if there is a cycle in either balance, it has a period of *four* and not two years. The 1949 crisis, as has already been suggested, was not principally due to a *worsening* of the gold and dollar balance, but to the continuance of a very adverse position. It is doubtful whether relaxation of import restrictions in the manner described above was an important factor.[3]

The behaviour of stocks in the United Kingdom, at least so far as we have been able to measure them, does not offer much support for the hypothesis. 1949, 1950 and 1951 are the years which seem to satisfy it best, and the other years do not fit in with it at all. The increase in stocks in 1949, some £50 millions at current prices, was small in relation to the gold and dollar deficit of about £350 millions in that year, and it is hard to believe that this alone was an important factor in the crisis. The fall in stocks in 1950, which was certainly substantial, was not, according to the authors of the Economic Survey,[1] due to import restrictions. The rise in stocks in 1951 was apparently fully accounted for by strategic stockpiling,[2] undertaken through fear of war rather than as a result of any policy of relaxation of import restrictions. More generally, it would seem that the hypothesis exaggerates the importance of stock changes as a cause of the fluctuations in the United Kingdom's balance of payments. As is demonstrated in Figure 2, the broad pattern of the fluctuations is much the same whether we allow for stock changes or not.[3]

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[1] The most complete exposition seems to be that given by S. I. Katz in 'Sterling's Recurring Postwar Payments Crises', *The Journal of Political Economy*, Vol. LXIII, 1955, pp. 216–220. Other writers who have put forward similar views are J. M. Fleming in 'Britain's Balance of Payments Problem', *The Proceedings of the Academy of Political Science*, Vol. XXV, May 1953, pp. 28, 29, and H. G. Johnson in '*The Overloaded Economy*', University of Toronto Press, 1952, p. 29.

[2] Thus Katz says 'This pattern (*i.e.* the biennial crisis) was largely the consequence of periodic depletion of inventories, resulting from drastic import restrictions imposed to check reserve losses, and of excessive liquidities throughout the sterling system, which facilitated overimporting by member countries. Recurring speculation against sterling helps to explain the biennial pattern of the payments difficulties'. (*op. cit.*, p. 216). Fleming says 'But the more important cause of instability lies nearer home and finds expression in fluctuations in imports from the dollar area and other parts of the non-sterling world. . . . The basic factor at work here, I suggest, is the delayed response of import-restrictions policy, and also, to some extent, of internal financial policy, to the balance-of-payments situation of the *previous* year. After the sterling area as a whole has had a bad year, all its members are frightened into observing a common policy of intensifying import restrictions, in defence of the common reserves. After a good year, however, such resolutions tend to evaporate in a spirit of 'Damn braces. Bless relaxes.' (*op. cit.*, pp. 28, 29.)

[3] There was, admittedly, a deterioration in the gold and dollar balance *during* 1949, especially during the third quarter of the year, which was offset by an improvement after devaluation in September 1949. Much of this deterioration can be accounted for by speculation against the pound, due to the continuance of the heavy deficit and consequent fall in the reserves, and by the reduction in sterling area earnings due to the recession in the United States.

The estimates given here support the view that we have tended to build up stocks when prices were high and run them down when they were low. Over the years 1946 to 1955 there was a net reduction in stocks of £157 millions at 1948 prices. We may compare what actually happened with what would have happened if this reduction had occurred evenly throughout the period, taking this as a neutral stocks policy. If we had followed this neutral policy, and if import prices had been unaffected, we should almost certainly have gained more than £157 millions in foreign assets from the liquidation of stocks. In most years prices were well above the 1948 levels. Our actual gain in foreign assets at current prices was only £14 millions, this being the sum of the last row of figures in Table 1. This calculation may overstate the difference between the effects of a neutral policy and what actually happened.[4] On the other hand the neutral policy is by no means the most profitable which (using hindsight) could be devised. It is probably fair to conclude that we sometimes misjudged the market (especially in 1946 and 1950), but there were inevitably many factors other than considerations of profit or loss which determined our import policy. One was strategic stockpiling in 1951. Another was the desire to mitigate an unfavourable balance of payments by running down stocks, and then rebuilding them when the balance was favourable—a policy which, as we have already seen, had little success.

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[1] See p. 58.

[2] According to the *Blue Book on National Income and Expenditure*, 1956, Table 52, the value of the physical increase in strategic stocks during 1951 was £127 millions, which may be compared with the estimate of £82 millions for the current value of the physical increase in stocks of mainly imported goods. Strategic stockpiling in other years amounted to £49 millions in 1952, £42 millions in 1953, £44 millions in 1954 and £3 millions in 1955. In 1951 there was, however, a very large increase in total stocks in the economy (£575 millions according to the Blue Book) which must have tended to worsen the balance of payments, though not necessarily by the same amount.

[3] The above remarks do not, of course, dispose of the hypothesis. Other important elements in it are the changes in the United Kingdom's *consumption* of imports, in unrecorded stocks and in the rest of the sterling area's imports, and these are not examined here.

[4] The calculation makes no allowance for the effect which the neutral policy would have had on import prices. It is possible that we tended to reduce stocks when larger purchases of these goods would have induced, *e.g.* for speculative reasons, a large price rise against us, while, in the years in which we increased stocks, an equal reduction in our purchases would not have had so large an effect on prices.

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# ASPECTS OF THE DYNAMICS OF CONSUMER BEHAVIOUR

## INCOME AND SAVINGS OVER TWO YEARS FROM THE 1954 REINTERVIEW SAVINGS SURVEY

*By* PETER VANDOME

The main Savings Surveys provide a detailed picture of the finances of income units during the year prior to interview, but they were not designed to collect information relating to more than one year. In order to provide data concerning a longer time period, and also to investigate certain problems of response and reliability, sub-samples of respondents to the main Surveys of 1952 and 1953 were interviewed for a second time in 1953 and 1954 respectively. It is the results of an analysis of the 1954 Reinterview Survey which are presented here.

These are the first data of their kind on savings and consumer finances to be collected in this country,[1] and although the sample is small—there were 429 successful interviews—the uniqueness of the data warrants an intensive analysis provided that the effects of the fairly large sampling fluctuations are considered before conclusions are drawn. The methodological interest of the sample lies mainly in the fact that we have much greater prior knowledge of both respondents and non-respondents. In the first part of the paper we study factors associated with non-response, and measure some of the effects that non-response has on the economic characteristics of the sample. Checks are also made on the reliability of reporting of respondents, and the differences between two methods of estimating changes in income and assets are measured.

Results of a more substantive nature form the second part of the paper (pp. 85–105) which is self-contained, apart from considerations of reliability discussed in the first part. These results relate to income and savings over periods longer than a year, and are mainly illustrations of methods, intended to show that data for testing some of the models in which econometricians are interested can be provided by reinterview samples. The income data are used to show how inequality in the income distribution is reduced as the accounting period is lengthened. Equilibrium distributions of income implied by current changes in individual incomes are estimated and the difficulties in relating the results to the real world are discussed. Consumers' attitudes are related to their subsequent savings behaviour and some methods by which savings trends may be predicted are suggested. M. Friedman's theory of the consumption function is tested and no strong evidence supporting it is found. Despite the small size of the sample some interesting results emerge, and it is clear that a larger sample, covering if possible more than two years, would yield much valuable data.

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[1] Reinterview Surveys were taken in the United States by the Survey Research Centre at Michigan in 1949 and 1953. Some results from the first are described in G. Katona, L. R. Klein, J. B. Lansing and J. N. Morgan, *Contributions of Survey Methods to Economics*, Columbia University Press, 1954.

The Survey contains information from several years and to avoid confusion dates will be used in the following sense. A single date refers to a Survey year; thus ' income for 1954 ' or ' 1954 income ' means income in the year Spring 1953—Spring 1954. Where a variable, such as 1953 income, can be calculated in two ways, the two estimates are referred to by the date of the interview from which they are derived, *i.e.*, the 1953 and 1954 estimates. Two or three year periods are referred to by the dates of the appropriate Survey years; thus the two year period 1953–54 is Spring 1952—Spring 1954.

## The 1954 Reinterview Data

### *Sampling scheme*[1]

In surveys in which economic information is collected it is usual to stratify the population and use varying sampling fractions among strata. These fractions are roughly proportional to the standard deviation of the major variable, and increase the precision of the estimate of the mean. Another objective, achieved by the same device, is to ensure adequate representation of groups, such as the wealthy, in which we are specially interested. Prior to interview not much information on which to base stratification is available. The rateable value of dwelling was used in the 1952 and 1953 Surveys, and juror qualification in 1954. In the 1954 Reinterview Survey, however, the choice was much wider since all the information gathered in 1953 was available, and gross income in 1953 was chosen as the most suitable basis for stratification; the 1953 respondents, already stratified by rateable value, were divided into those with incomes of less than £800 in 1953 and those with £800 or more. Sampling fractions of one-fifth and unity, respectively, yielded a sub-sample of 649 as set out in Table I. Four hundred and twenty-nine schedules were completed and matched satisfactorily with a 1953 schedule.

TABLE I

*Sample Structure for 1954 Reinterview Survey*

| *Stratum* | | | | | |
|---|---|---|---|---|---|
| Rateable value of dwelling* (£ p.a.) | Gross income in 1953 Survey (£) | *Number in 1953 Survey* | *Number selected for 1954 reinterview* | *Successes in 1954 reinterview* | *Crude response rate* (%) |
| 0–29 | 0–799 | 1,126 | 218 | 152 | *69.7* |
| ,, | 800 and over | 57 | 57 | 39 | *68.4* |
| 30 and over | 0–799 | 684 | 143 | 88 | *61.5* |
| ,, | 800 and over | 231 | 231 | 150 | *64.9* |
| All strata | | 2,098 | 649 | 429 | *66.1* |

* In London the rateable value strata were divided at £40.

[1] Details of the sample for the 1953 Survey (*i.e.* the parent sample), are given in T. P. Hill, L. R. Klein and K. H. Straw, ' The Savings Survey, 1953: Response Rates and Reliability of Data ', BULLETIN, Feb. 1955.

*Response*

A fuller analysis of response is possible in this Survey because a large amount of prior knowledge is available for respondents and non-respondents alike. It is thus possible to add to our knowledge of the factors leading to non-response, and perhaps to verify some ideas on the bias in the Savings Surveys caused by non-response. It must however be borne in mind that the whole Reinterview Sample is unrepresentative in the respect that it contains only people who have already co-operated once in a searching inquiry into their financial affairs.

The overall weighted response rate[1] was 68.8 per cent, somewhat higher than in the main Surveys in 1953 and 1954, though less than in 1952:

| Survey | 1952 | 1953 | 1954 | 1954 Reinterview |
|---|---|---|---|---|
| Weighted response rate | 75.1 | 66.1 | 67.2 | 68.8 |

The failures were classified by reasons for failure, the relative importance of which is shown in Table II, together with roughly corresponding figures for the main Surveys. A failure is termed a reinterview failure where all members of the income unit have died or moved, or where at the editing stage an otherwise acceptable schedule does not match up with its 1953 counterpart. The tiny proportion of cases where no interview was attempted because of prior knowledge about the respondent were also included among the reinterview failures. The remaining failures are of the same types as occur in the main Surveys.

TABLE II

*Response Rates and Reasons for Failure*

(percentages of income units)

| | *1954 Reinterview Survey* | | *1952 Survey†* | *1953 Survey†* | *1954 Survey†* |
|---|---|---|---|---|---|
| Response rate (successes) ... ... ... | | 68.7 | 75.1 | 66.1 | 67.2 |
| Reinterview failures: | | 8.3 | — | — | — |
| No interview attempted... ... ... | ...* | | | | |
| No longer in dwelling or immediate area | 5.1 | | | | |
| Died (whole income unit) ... ... | 2.0 | | | | |
| Mis-match ... ... ... ... | 1.2 | | | | |
| Non-contacts: | | 7.3 | 10.9 | 11.1 | 11.3 |
| Cannot be located ... ... ... | ... | | | | |
| Always out or away ... ... ... | 4.7 | | | | |
| Too old or too ill ... ... ... | 2.6 | | | | |
| Direct refusals ... ... ... ... | | 12.8 | 12.9 | 21.9 | 21.3 |
| Editing failures ... ... ... ... | | 2.9 | 1.1 | 0.9 | 0.2 |
| Total possible income units ... ... | | 100.0 | 100.0 | 100.0 | 100.0 |

*... indicates less than 0.05 per cent.

†Figures in this column are approximate, being based on estimates of the number of income units in dwellings where no information was obtainable.

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[1] In the tabulations each income unit was given a weight, which is inversely proportional to its probability of selection, to correct the effects of different sampling fractions. In this sample the appropriate weight is that applied in 1953 multiplied by the weight appropriate to the reinterview stage of sampling.

The proportion of direct refusals is much smaller than in the 1953 and 1954 Surveys, but the same as in 1952. The best way to compare the refusal rates in the Reinterview and main Surveys is to consider the ratio of direct refusals to total contacts. Taking the number of contacts as successes plus direct refusals plus editing failures,[1] direct refusals form 14.5 per cent of the 1952 contacts; 24.6 per cent of the 1953 contacts; 24.0 per cent of the 1954 contacts; and 14.9 per cent of the reinterview contacts.

The 1952 Survey is markedly different from the other main Surveys, in having a much lower rate of refusals, but a considerable reduction in the refusal rate is apparent in the Reinterview Survey compared with the 1953 and 1954 Surveys. This is probably due to the least co-operative people having been weeded out by the first Survey. A more detailed analysis of the direct refusals showed that an important factor influencing response in the reinterviews was certainly the first interview. Between half and two-thirds of the refusals seem to have been influenced by the previous interview; in a third of the cases resentment had been aroused by the length or nature of the questionnaire. Other frequent reasons were that ' once is quite enough ', and that another interview was pointless as ' everything is just the same '. It was noticed that some people who were very co-operative in 1953 refused for reasons such as these in 1954. A large proportion of the direct refusals in the Reinterview Survey were therefore a kind of reinterview failure and this reinforces the impression that a considerable proportion of direct refusals in the main Surveys come from naturally unco-operative people. Temporary factors such as the number of engagements on hand are less important.

Response in the 1952 Survey must now be taken into account. The difference between the proportion of refusals in this Survey and in subsequent years has been put down to a greater interviewing effort in 1952. This, it is supposed, led to many of the less co-operative income units becoming successes. If this is so we should expect a fairly high refusal rate in the reinterview of the 1952 sample, the border-line cases dropping out at this stage rather than at the time of the first interview. In fact the main difference in response rates between the 1953 and 1954 Reinterview Surveys was in the number of refusals which were 17 per cent in the former Survey, over 4 per cent higher than in the latter. This result goes a certain way towards reconciling the refusal rates shown in Table II, and supports the theory that the interviewers dealt with waverers more successfully in 1952. The conclusions drawn from the comparison of the 1953 Survey with the subsequent, related, Reinterview Survey will hold good with the qualification that good interviewing techniques can persuade some unco-operative people to respond.

Response rates for some important demographic and economic characteristics appear in Tables III–VII. Certain patterns of response have emerged from the main Surveys which are reinforced by the reinterview data.[2]

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[1] Also included for the Reinterview Survey were mis-matches.

[2] See T. P. Hill, L. R. Klein and K. H. Straw, *op. cit.*, pp. 89–102; and T. P. Hill, ' Incomes, Savings and Net Worth: The Savings Surveys of 1952–1954 ', BULLETIN, May 1955, pp. 159–171.

Response is low among secondary and single person income units. These are usually in the lowest or highest age groups, and are often females, so that response is also low for these groups, and for the retired and unoccupied. A second feature which is less prominent, but of greater economic significance is the low response from those who may be expected to own large assets. We may expect to find such income units among the self-employed; those who own their houses outright; those with high liquid assets; with high incomes; and among those with very high savings or dissavings. All these classes, except the last, have a low response rate. The usual demographic factors, including those in Table III, were considered. They did not yield much new information, but an analysis by housing status was possible and, in particular, the influence of secondaries was separated from some other factors. In addition certain inconsistencies with earlier results were found; these suggest that the factors leading to non-response are complex and variable.

An analysis of response by sex, size of income unit, and status within the household isolates the secondaries and shows the importance of the number of persons in the income unit:

| | *Primaries with one person* | *Primaries with two persons* | *Primaries with three or more persons* | *Secondaries* |
|---|---|---|---|---|
| Male ... ... | 76.7 | 71.0 | 79.8 | 56.8 |
| Female ... ... | 58.8 | 68.7[1] | | 54.8 |
| Both sexes ... | 63.3 | 71.0 | 79.3 | 55.9 |

[1] There were too few income units in this class to sub-divide further.

Secondaries are usually one person units and have a low response rate. This is the main reason for the low response of 56 per cent from all one person units (Table III). When secondaries are removed, however, we still find that response improves as size of income unit increases. Among the secondaries themselves there is an increase in response as size increases; the response rate for single person secondaries is 50 per cent compared with 56 per cent for all secondaries. There is little difference in response between male and female secondaries but primaries with a female head have a lower response than those with a male head.

Rather more than half the non-respondents were either secondaries or single person primaries, and the majority of such people were either young or old, so that a low response is to be expected in the highest and lowest age groups, mainly because of reinterview failures and non-contacts (Table III). The old do not often move but over three-quarters of the reinterview failures in the upper age group were caused by death. A similar proportion of the non-contacts in this group was caused by illness. The young, on the other hand, frequently move or are always out when the interviewer calls. In the middle age ranges there are wide variations in response which led to a distorted age distribution, the chief feature of which was a bulge in the 45–54 years group similar to that obtained in the main 1954 Survey.[1] No systematic factor which would affect the 45–54 years group in this way can be isolated, so it seems that the similarity is fortuitous. Response is just as high in the 25–34 year old group, again for no easily explainable reason beyond sampling fluctuations.

TABLE III

*Response Rates and Reasons for Failure*

(percentages of income units)

| *Type of income unit* | *Successes (response rate)* | *Reinterview failures* | *Non-contacts* | *Direct refusals* | *Editing failures* | *Total* |
|---|---|---|---|---|---|---|
| **Sex of head** | | | | | | |
| Male ... ... ... ... | 72.6 | 5.9 | 5.2 | 12.4 | 4.0 | 100 |
| Female ... ... ... ... | 58.5 | 14.7 | 12.6 | 13.8 | 0.3* | 100 |
| **Number of persons** | | | | | | |
| One ... ... ... ... | 56.2 | 15.1 | 11.6 | 16.8 | 0.2* | 100 |
| Two ... ... ... ... | 73.3 | 2.0 | 6.0 | 12.7 | 6.0 | 100 |
| Three and over ... ... ... | 78.8 | 6.3 | 3.4 | 8.2 | 3.2 | 100 |
| **Age of head** | | | | | | |
| 18—24 ... ... ... ... | 50.7 | 26.6 | 13.5* | 9.2* | — | 100 |
| 25—34 ... ... ... ... | 77.9 | 7.3 | 3.2 | 10.8 | 0.8* | 100 |
| 35—44 ... ... ... ... | 64.9 | 6.0 | 12.5 | 14.4 | 2.2* | 100 |
| 45—54 ... ... ... ... | 77.9 | 2.6 | 4.1 | 10.5 | 4.9 | 100 |
| 55—64 ... ... ... ... | 68.6 | 6.1 | 0.6* | 21.5 | 3.2* | 100 |
| 65 and over ... ... ... | 61.5 | 10.6 | 12.1 | 10.9 | 4.8 | 100 |
| **Housing status** | | | | | | |
| Owns outright ... ... | 63.8 | 5.3 | 13.1 | 13.5 | 4.4 | 100 |
| Owns with mortgage ... ... | 84.6 | 0.4* | 5.9 | 9.1 | 0.1* | 100 |
| Rents council house ... ... | 86.2 | 3.8* | — | 6.8* | 3.1* | 100 |
| Rents other unfurnished ... | 68.3 | 6.2 | 7.9 | 12.6 | 5.1 | 100 |
| Rents furnished ... ... | 19.8 | 80.2 | — | — | — | 100 |
| Rent free ... ... ... | 78.4 | 15.5* | 0.5* | 2.8* | 2.8* | 100 |
| All primaries ... ... | 72.6 | 6.4 | 6.6 | 10.7 | 3.7 | 100 |
| Secondaries ... ... ... | 55.9 | 14.7 | 9.3 | 19.8 | 0.3* | 100 |
| **Occupation** | | | | | | |
| Self-employed ... ... ... | 65.6 | 13.8* | 2.9 | 15.2 | 2.5* | 100 |
| Managers and technical ... | 77.0 | 4.4 | 10.5 | 6.1 | 2.0* | 100 |
| Clerical and sales ... ... | 63.8 | 14.0 | 7.4 | 14.7 | 0.2* | 100 |
| Manual ... ... ... ... | 71.3 | 4.2 | 6.5 | 14.0 | 4.0 | 100 |
| Retired and unoccupied ... | 63.0 | 15.0 | 8.6 | 11.1 | 2.3* | 100 |
| All income units ... ... ... | 68.7 | 8.3 | 7.3 | 12.8 | 2.9 | 100 |

* Based on less than 5 failures.

When housing status is considered perhaps the most important point is the comparatively low response from those owning their houses outright. This is important as houses are a major component of wealth, and outright ownership is often an indication of other forms of wealth. The fairly high rate of editing failures also indicates the presence of income units in complex financial situations. The other outstanding item of interest is the low response of those renting furnished accommodation. About four-fifths of them were failures, almost exclusively because of removal. This table provides strong evidence that response is associated (negatively) with the mobility of the income unit. Of the groups with a high response rate, those with a mortgage may be tied by the mortgage itself; those renting a council house would be reluctant to leave, considering the lengths of waiting lists for council houses in 1954; those living rent free have an obvious motive for staying where they are. Average response is obtained from those renting unfurnished accommodation, and low response from the most mobile groups, *i.e.*, secondaries and those renting furnished accommodation.

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[1] See T. P. Hill, *op. cit.*, p. 165.

The response of different occupational groups shows some differences from the 1953 Survey. Notably the response from managers is high and from clerical and sales workers it is low. The clerical and sales group had a large number of reinterview failures, as might be expected since many are young women and secondaries, but there was also a large number of direct refusals. In fact, the manual and clerical and sales workers were all more prone to refuse in this Survey than in the 1953 Survey, and there is altogether no great variation in refusal rate between occupations. It is noteworthy, however, that the highest refusal rate came from the self-employed, for this group is persistently difficult to interview. The variation in response between occupations is not as great as in the 1953 Survey, when response appeared to be very high for manual workers and very low (of the order of 50 per cent) for the self-employed.[1]

In 1953 response was found to increase as density of population fell. Our figures, on the other hand, show rural areas with the lowest response and highest rate of direct refusals. Sampling fluctuations, here as elsewhere, will be more than twice as great in the Reinterview Survey as in the main 1953 Survey because of the smaller numbers involved. However, this appears to be another result which is inconsistent with the 1953 Survey. A few relationships have occurred repeatedly in the various Surveys that have been completed, namely high response from families with dependent children; low response from those in the highest wealth classes; and low response from the self-employed. On the other hand, peculiarities appear in isolated years. In 1954, response was particularly high, as noted above, in the age group 45–54. The same appears to be true of the tendency towards higher response in rural areas for the 1953 Survey. There is little basis for concluding that there is a definite association between density of population *per se* and response rate.

The figures for response by income, liquid assets and savings are especially interesting as no comparable figures can be obtained from the main Surveys.

Response is poor at the extremes of the income distribution, reflecting the two main tendencies already observed. The ' non-family ' income units (secondaries, persons living alone, and the old), who usually have low incomes, and the wealthy income units both respond badly. The reasons for failure

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[1] See T. P. Hill, L. R. Klein and K. H. Straw, *op. cit.*, p. 95, Table V. The figures in this table give an inflated idea of response as they refer only to income units where the occupation of the head was ascertained.

TABLE IV

*Reasons for Failure by Gross Income*

(percentages of income units)

| *Gross income* (£) | *Successes (response rate)* | *Reinterview failures* | *Non-contacts* | *Direct refusals* | *Editing failures* | *Total* |
|---|---|---|---|---|---|---|
| 0—299 ... ... | 63.0 | 15.4 | 10.6 | 7.5 | 3.5 | 100 |
| 300—599 ... ... | 70.3 | 3.9 | 5.4 | 18.2 | 2.2 | 100 |
| 600—999 ... ... | 78.2 | 5.5 | 4.3 | 8.6 | 3.4* | 100 |
| 1,000 and over ... | 64.8 | 3.2 | 10.4 | 17.2 | 4.4 | 100 |
| All income units ... | 68.7 | 8.3 | 7.3 | 12.8 | 2.9 | 100 |

* Based on less than 5 failures.

are fairly consistent with the earlier findings, but there are some erratic features. As expected many reinterview failures and non-contacts occur in the lowest income class, and those with the highest incomes are most liable to refuse or to be non-contacts. The rate of refusals varies between the two middle income ranges, this being another example of varying tendencies in response. This difference, and the corresponding difference in the response rates are difficult to pin down to any particular factor. The concentration of managers (whose response was high) in the income class £600–999 is probably the most important single factor but it only accounts for a quarter of the difference. The unusually high response among the managers is, in any case, still unexplained. The high refusal rate in the income class £300–599 reflects the high refusal rate for manual and clerical and sales workers which has already been noted.

The main Surveys have also been found to be deficient in the upper tail of the income distribution.[1] The Reinterview Survey may have done worse in this respect as it is reasonable to suppose that some wealthy people, whose interviews on the first occasion were especially lengthy because of the complexity of their affairs, would be reluctant to repeat the performance. The reinterview evidence, however, does support the impression that the wealthy have a lower than average response in the Savings Surveys, though it does not tell us the size of the bias, or its effects, in the main Surveys.

TABLE V

*Reasons for Failure by Liquid Assets*

(percentages of income units)

| *Liquid assets* (£) | *Successes (response rate)* | *Reinterview failures* | *Non-contacts* | *Direct refusals* | *Editing failures* | *Total* |
|---|---|---|---|---|---|---|
| Nil ... ... ... | 70.4 | 11.3 | 4.8 | 10.5 | 3.0 | 100 |
| 1— 99 ... ... | 66.5 | 7.1 | 6.6 | 17.3 | 2.6* | 100 |
| 100—399 ... ... | 66.7 | 8.5 | 13.1 | 9.1 | 2.6* | 100 |
| 400—999 ... ... | 79.1 | 2.5* | 4.0 | 8.9 | 5.6* | 100 |
| 1,000 and over ... | 59.8 | 4.7 | 15.6 | 18.8 | 1.1 | 100 |
| All income units ... | 68.7 | 8.3 | 7.3 | 12.8 | 2.9 | 100 |

* Based on less than 5 failures.

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[1] See, *e.g.*, T. P. Hill, L. R. Klein, K. H. Straw, *op. cit.*, p. 114.

When liquid assets are considered we find a low response in the top range, which was due mainly to non-contacts and direct refusals from the wealthy group. The other group with a low response rate (the ‘ non-family ’ income units) do not show up clearly in the table for liquid assets, as the failures in this group are distributed in much the same way as all the failures, except for a smaller proportion in the highest group. Thus in each liquid assets class a low response from ‘ non-family ’ income units is balanced by a high response from the rest. Refusals follow no consistent pattern, probably because, as has already been shown, quite diverse groups showed high refusal rates.

TABLE VI

*Reasons for Failure by Savings*

(percentages of income units)

| *Savings* | *Successes (response rate)* | *Reinter-view failures* | *Non-contacts* | *Direct refusals* | *Editing failures* | *Total* |
|---|---|---|---|---|---|---|
| Dissaved: | | | | | | |
| £50 or more ... | 78.3 | 1.9 | 3.3 | 13.1 | 3.5 | 100 |
| £ 1—49 ... ... | 66.9 | 7.4 | 7.6 | 16.5 | 1.5 | 100 |
| No savings or dissavings ... ... | 50.3 | 30.3 | 12.7 | 6.8* | — | 100 |
| Saved: | | | | | | |
| £ 1—49 ... ... | 76.1 | 3.3 | 8.1 | 6.9 | 5.6* | 100 |
| £50 or more ... | 72.0 | 6.5 | 3.7 | 10.8 | 7.0 | 100 |
| Not ascertained ... | 45.8 | 10.2* | 5.9* | 38.1 | — | 100 |
| All income units ... | 68.7 | 8.3 | 7.3 | 12.8 | 2.9 | 100 |

* Based on less than 5 failures.

The analysis of response by liquid assets masked the absence of secondaries and single person income units, but that by savings masks the absence of the wealthy. Large savings or dissavings may be expected of the wealthy so we expect a low response in the extreme savings classes. This is not so however, and the response rates for savings groups of ±£100 and over, and ±£200 and over, are still higher than those for ±£50 and over.

In spite of the high response from the extreme savings groups, mean savings are found to be twice as great for the failures as for the successes. This difference reflects the effect a very small number of people (the failures with extreme savings) have on mean savings as illustrated by these figures:

| | *Successes* | *Failures* |
|---|---|---|
| Savings between +£200 and −£200 ... ... ... | £5.5 | £5.3 |
| Savings ±£200 and over ... ... ... ... | £26 | £327 |
| All income units ... ... ... ... ... | £6.7 | £13.3 |

The wealthy (defined as those with incomes or liquid assets of £1,000 or more[1]) are concentrated in extreme savings classes, but their numbers are small and their presence among the failures is obscured by the high re-

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[1] This definition will include many who do not consider themselves to be wealthy. Only 6 per cent of the sample are covered by it, however, and a more exclusive definition would yield a group too small to be of use in this analysis.

TABLE VII

*Response Rates by Savings and Gross Income or Liquid Assets*

(percentages of income units)

| *Gross income or liquid assets 1953* | *Savings 1953 ±£100 or more* | *Savings 1953 ± £200 or more* |
|---|---|---|
| Gross income less than £1,000 ... ... | 83.5 | 92.4 |
| Gross income £1,000 or more ... ... | 68.9 | 69.3 |
| Liquid assets less than £1,000 ... ... | 85.3 | 87.2 |
| Liquid assets £1,000 or more ... ... | 56.5 | 73.6 |
| All income units in savings class ... ... | 79.8 | 83.4 |

sponse from other income units in these classes. The wealthy tend to have high savings or dissavings, although it is not true that the extreme savers belong predominantly to the wealthy group. Of the failures with incomes of £1,000 or more, 65 per cent have savings of £100 or more in absolute value, while for high liquid asset groups (£1,000 or more) the corresponding proportion is 55 per cent. If the wealthy are considered separately in the high savings classes a marked difference in response is found. Table VII shows that, although response is high in the extreme savings classes, the response rates for income units with high income or liquid assets are all less than the respective class means. They are, in fact, not greatly different from the rates for all income units with high incomes (Table IV) or high liquid assets (Table V). The low response from the wealthy has therefore been confirmed in the analysis by savings, but the wealthy are a small group and savings are not a good criterion for distinguishing them.

TABLE VIII

*Means of Age and Economic Characteristics*

| *Variable* | *1953 Survey* | *1954 Reinterview Survey (characteristics in 1953)* | |
|---|---|---|---|
| | | *successes* | *failures* |
| Age of head ... ... ... ... ... ... | 47 | 46 | 48 |
| Gross income (£) ... ... ... ... ... | 434 | 443 | 417 |
| Liquid assets (all income units) (£) ... ... | 194 | 178 | 199 |
| Liquid assets (those with liquid assets) (£) ... | 290 | 276 | 297 |
| Savings (£) ... ... ... ... ... ... | 4 | 7 | 13 |
| Durables expenditure (all income units) (£) ... | 23 | 23 | 18 |
| Durables expenditure (those with durables expenditure) (£) ... ... ... ... ... | 100 | 113 | 86 |

The tendency noted above for response to increase with volume of savings was also found in the homogeneous group comprising primary income units with at least two persons and gross income and liquid assets in 1953 less than £1,000:

| Savings (£) ... ... ... | 100 and over | 50–99 | 1–49 | Nil | −1–49 | −50–99 | −100 or less | N.A. | All |
|---|---|---|---|---|---|---|---|---|---|
| Response rate (%) ... ... | 93.8 | 84.8 | 73.6 | 71.8 | 73.5 | 72.3 | 91.9 | 77.8 | 76.3 |

This may of course be a fortuitous result, or there may be other factors, correlated with savings, which influence the group; it is certainly difficult to explain this correlation.

It is when savings are considered that editing failures show the most consistent pattern. It appears that savings behaviour is the economic factor most closely associated with editing failures. These failures occur because the interviewer has not provided sufficient information for the editor. The criterion for an editing success is that income should be ascertained and that other information should be consistent. It frequently happens that where the income data are difficult to disentangle, savings (positive or negative) are high.

Some of the effects of the variations in response described will now be considered. The failures on average have lower incomes than the successes (Table VIII). Although response is low from members of the high income groups the lower mean income among the failures is explained by the tendency to miss secondaries and single person income units, both of which have lower than average income; when only primaries with two or more persons are considered the mean gross income is £540 for successes and £579 for failures. Also, liquid assets are often a better indication of wealth than is income, and the mean of liquid assets for the failures is higher. Liquid assets are more unequally distributed than income, so that a large number of secondaries does not obscure the presence of the wealthy to the same extent as in the case of income.

The presence of the wealthy amongst the failures is brought out by considering the concentration of income and liquid assets in the two groups. For the failures, those with gross incomes of £1,000 or more received 20.5 per cent of the total income, while the corresponding figure for the successes is only 12.9 per cent. Similar figures for those with liquid assets of £1,000 and over are 60.5 per cent for failures and 42.2 per cent for successes. There is also a bias in the Lorenz index, although this does not necessarily follow from the above statistics. The Lorenz concentration index, or measure of inequality in the distribution,[1] for income in 1953 is .332 for successes and .358 for successes and failures combined. This shows a bias of seven per cent in the figure for successes alone, larger than had been expected, for the Lorenz index is relatively insensitive to changes in the distribution. There is, presumably, a downward bias in the last figure compared with the population value. The measures of concentration discussed later (pp. 85–9) should therefore be regarded as conservative estimates.

In Tables IX and X are compared the distributions of a number of variables for the successes and failures. These summarise the effects of the patterns of response already discussed, and provide a comparison with other Surveys. The differences at the upper end of the liquid assets scale correspond to the low response rates observed. In terms of percentage points they do not appear large, and this serves to emphasise how critical the number of

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[1] This measure is defined in footnote 2, page 85.

### TABLE IX

*Distributions of Demographic Characteristics*

(percentages of income units)

| *Type of income unit* | *1953 Survey* | *1954 Reinterview Survey** | |
|---|---|---|---|
| | | *successes* | *failures* |
| **Region** | | | |
| Scotland | 10.5 | 10.0 | 8.7 |
| North of England | 26.4 | 26.7 | 25.3 |
| Midlands and Wales | 24.2 | 23.5 | 26.0 |
| South and East England | 38.9 | 39.8 | 39.9 |
| **Size of town** | | | |
| Conurbations | 36.0 | 33.9 | 36.8 |
| Other urban | 44.9 | 47.2 | 42.1 |
| Rural | 19.1 | 18.9 | 21.0 |
| **Age of head** | | | |
| 18—24 | 10.7 | 7.3 | 14.1 |
| 25—34 | 18.0 | 22.8 | 13.9 |
| 35—44 | 20.3 | 19.3 | 19.7 |
| 45—54 | 17.9 | 19.5 | 14.4 |
| 55—64 | 13.2 | 14.7 | 14.4 |
| 65 and over | 19.9 | 16.4 | 23.6 |
| **Sex of head** | | | |
| Male | 73.8 | 76.4 | 63.3 |
| Female | 26.2 | 23.6 | 36.7 |
| **Occupation of head** | | | |
| Self-employed | 4.4 | 3.7 | 4.3 |
| Managers and technical | 7.3 | 9.3 | 6.1 |
| Clerical | 8.3 | 6.2 | 7.2 |
| Sales | 5.6 | 5.5 | 7.3 |
| Skilled manual | 34.7 | 39.3 | 36.6 |
| Unskilled manual | 17.0 | 14.9 | 11.3 |
| Retired and unoccupied | 22.8 | 21.1 | 27.2 |
| **Number of persons** | | | |
| One | 36.2 | 30.6 | 52.3 |
| Two | 27.0 | 32.3 | 25.8 |
| Three | 15.7 | 15.8 | 9.2 |
| Four | 12.6 | 14.4 | 7.5 |
| Five | 5.2 | 4.7 | 2.2 |
| Six and over | 3.3 | 2.2 | 2.9 |
| **Housing status** | | | |
| Owns outright | 11.1 | 10.4 | 12.9 |
| Owns with mortgage | 10.0 | 14.7 | 5.9 |
| Rents council house | 14.3 | 15.2 | 5.3 |
| Rents other unfurnished accommodation | 37.1 | 37.0 | 37.7 |
| Rents furnished accommodation | 1.4 | 0.4 | 3.3 |
| Rent free | 3.4 | 3.4 | 2.1 |
| Secondary income unit | 22.7 | 18.9 | 32.9 |

*These distributions refer to 1954 for the successes (with the exception of age), and to 1953 for the failures. The age of head tabulated for the successes is the age reported in 1954 minus one. Besides age, there were a certain number of changes in the size of income unit between 1953 and 1954, but very few other changes.

very wealthy income units is to the kind of measurements that the Savings Surveys attempt, especially estimates of the concentration of such variables as income and liquid assets which will be affected more than the corresponding means.

TABLE X

*Distributions of Economic Characteristics*

(percentages of income units)

| *Type of income unit* | *1953 Survey* | *1954 Reinterview Survey (characteristics in 1953)* | |
|---|---|---|---|
| | | *successes* | *failures* |
| **Gross income (£)** | | | |
| 0— 99 ... ... ... | 5.4 | 5.3 | 7.4 |
| 100— 199 ... ... ... | 17.3 | 15.3 | 20.6 |
| 200— 299 ... ... ... | 13.7 | 12.6 | 14.7 |
| 300— 399 ... ... ... | 17.0 | 16.3 | 20.5 |
| 400— 499 ... ... ... | 16.5 | 17.2 | 11.9 |
| 500— 599 ... ... ... | 12.2 | 12.3 | 10.1 |
| 600— 699 ... ... ... | 7.8 | 11.3 | 3.0 |
| 700— 799 ... ... ... | 2.9 | 2.6 | 4.1 |
| 800— 999 ... ... ... | 3.9 | 3.7 | 3.7 |
| 1,000—1,499 ... ... ... | 2.1 | 2.1 | 2.0 |
| 1,500—1,999 ... ... ... | 0.5 | 0.5 | 0.7 |
| 2,000 and over ... ... | 0.9 | 0.8 | 1.2 |
| **Liquid assets (£)** | | | |
| Nil ... ... ... ... | 33.1 | 35.7 | 32.9 |
| 1— 49 ... ... ... | 26.3 | 24.9 | 27.0 |
| 50— 99 ... ... ... | 9.5 | 8.6 | 10.1 |
| 100— 199 ... ... ... | 11.3 | 10.2 | 11.2 |
| 200— 399 ... ... ... | 8.0 | 7.4 | 8.2 |
| 400— 599 ... ... ... | 4.1 | 5.5 | 4.3 |
| 600— 999 ... ... ... | 3.4 | 4.3 | 1.4 |
| 1,000—1,999 ... ... ... | 2.2 | 2.0 | 2.5 |
| 2,000 and over ... ... ... | 2.1 | 1.4 | 2.5 |
| **Total Savings (£)** | | | |
| Positive 200 and over ... ... | 2.1 | 3.2 | 1.8 |
| 100—199 ... ... | 3.5 | 3.6 | 1.7 |
| 50— 99 ... ... | 6.9 | 9.3 | 6.4 |
| 25— 49 ... ... | 10.3 | 6.8 | 10.1 |
| 1— 24 ... ... | 34.8 | 35.2 | 35.5 |
| None | 11.1 | 8.2 | 17.8 |
| Negative 1— 24 ... ... | 11.7 | 11.9 | 9.6 |
| 25— 49 ... ... | 6.5 | 11.1 | 6.2 |
| 50— 99 ... ... | 4.9 | 4.6 | 5.0 |
| 100—199 ... ... | 3.0 | 2.7 | 2.5 |
| 200 and over ... | 3.1 | 2.2 | 0.6 |
| Savings not ascertained ... | 2.1 | 1.1 | 2.9 |

The means for total savings in Table VIII deserve comment. The mean for the failures is twice that for the successes, while the figure for successes plus failures (£9) is twice the mean in the 1953 Survey. The latter discrepancy can be attributed to sampling errors alone,[1] and shows again how much a variable like savings is affected by the inclusion or exclusion of a few extreme cases. The difference between the successes and failures will be partly accounted for by sampling error, but it also reflects the nature of the failures in the same way as the liquid assets figures.[2] Since durables expenditure can for some purposes be regarded as a form of savings, we can compare the combined figures for savings plus durables in Table VIII. The difference in savings plus durables expenditure between successes and failures is much smaller, *i.e.*, £2.[1]

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[1] The sampling error of mean savings in the 1953 Survey is £2.7; in the 1954 Reinterview Survey it is £8.4.

[2] The difference has also been traced to the extreme savings classes. See above, p. 73.

### *Conclusions*

1. The number of persons in the income unit is the most important single factor affecting response. Secondary income units (usually comprising only one person) have a particularly low response rate.
2. A high response rate is obtained from income units which are stable in the sense that they are unlikely to move, and have family ties, especially children. Factors indicating degree of stability are housing status, marital status and number of persons, but other considerations such as the relatively high mobility of professional people are also relevant.
3. Certain patterns of response are affected by the reinterview nature of the Survey: notably direct refusals were less frequent than in the main Surveys. Failures due to removal, which occur especially among secondaries and those renting furnished accommodation, were classed as reinterview failures. They can also occur, of course, in ordinary surveys where the sampling unit is a named individual and not an address.
4. The wealthy have a relatively low response rate, but this result may not apply so strongly to the main Surveys as to the Reinterview Survey. The absence of a very small number of wealthy people can have a marked effect on the economic characteristics of the sample. Therefore a high overall response rate will not necessarily guarantee an accurate estimate of such population parameters as the concentration of liquid assets or income, or of mean savings.
5. The relatively low response from both the most and the least wealthy leads to fairly consistent estimates of the means of variables such as income and liquid assets (but not of mean savings) which are not extremely concentrated.
6. The number of direct refusals can be appreciably affected by the quality of the field work. The number of editing failures also depends on the interviewing standards. It should also be remembered that variations in efficiency between interviewers, about which we have no information, can cause biases in stratified samples like the Savings Surveys.

### *Reliability*

In assessing the reliability of a survey two main sources of error must be considered. First there are the random sampling errors, and second there are errors within the survey itself which can arise at any of several stages. Respondents do not always give accurate information, either wilfully, or

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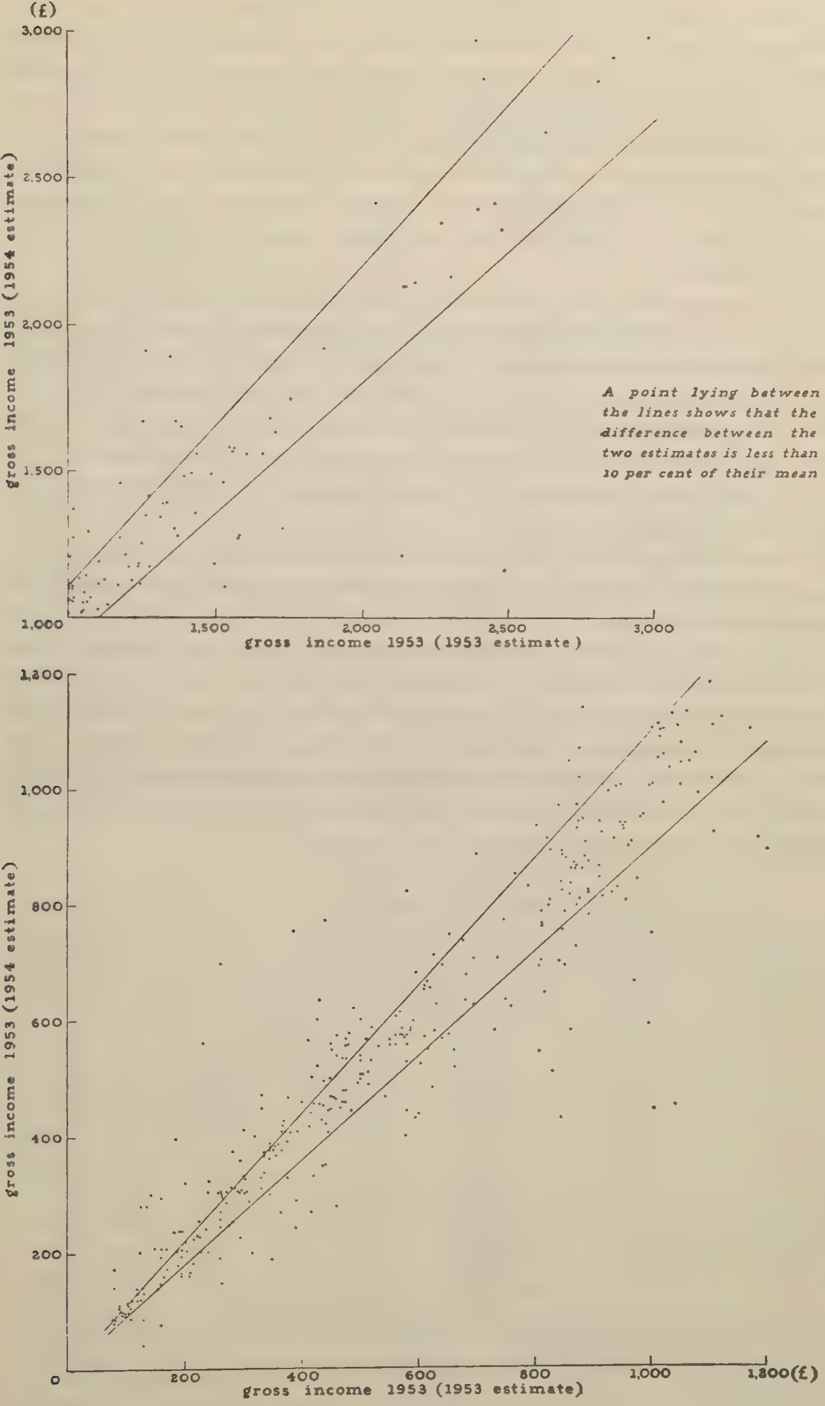
[1] The figures in Table VIII have been rounded to the nearest pound.

Fig. 1

## Two Estimates of Income Compared



*A point lying between the lines shows that the difference between the two estimates is less than 10 per cent of their mean* through faulty memory, or because they do not understand what is required; the interviewers are liable to make mistakes; and further errors occur at the editing, coding and tabulating stages. Sampling errors for the 1954 Reinterview Survey have been discussed in a separate paper,[1] and it is the errors that occur within the Survey itself that will be considered in this section.

In the reinterview questionnaire information was sought about the previous year's income and liquid assets. This information has been used to investigate errors by comparing the reinterview answers with those given in the first interview.

Figure 1 shows scatter diagrams for the two estimates of gross income in 1953.[2] A direct estimate was obtained in 1953, and the 1954 estimate is the difference between reported income in 1954 and the remembered change in income. If the two estimates agree the point will lie on the diagonal, and as a guide to interpretation lines have been drawn indicating the limits within which a point must lie if the difference between the two estimates is to be less than 10 per cent of the mean of the estimates. Just over two-fifths of the points lie outside these limits.

The most striking feature of the figure is that the spread of points about the diagonal is much the same at all levels of income, so that the proportionate discrepancies are larger for low incomes. In about a quarter of the observations the difference between the estimates is more than £100, and a few of these differences are very large, of the order of £1,000. At incomes below £600 there is a preponderance of points above the diagonal. There was a general increase in incomes between 1953 and 1954, and if we assume that the estimates of annual income are more accurate than the estimates of income change, this means that many people, especially wage earners, underestimated the increase in their income between the two years.

TABLE XI

*Comparison of 1953 and 1954 Estimates of Income in 1953*

| *Gross income (£) 1953 1953 estimate* | *Percentage of income units* | *Mean gross income (£) 1953* | | *Col. 2–col. 1* | *Col. 2–col. 1 as % of col. 1* |
|---|---|---|---|---|---|
| | | *col. 1 1953 estimate* | *col. 2 1954 estimate* | | |
| 0— 99 | *5.3* | 89 | 104 | 15 | *17* |
| 100— 199 | *15.3* | 152 | 191 | 39 | *26* |
| 200— 299 | *12.6* | 254 | 276 | 22 | *9* |
| 300— 399 | *16.3* | 358 | 393 | 35 | *10* |
| 400— 499 | 17.2 | 448 | 500 | 52 | *12* |
| 500— 599 | *12.3* | 546 | 551 | 5 | *1* |
| 600— 699 | *11.3* | 626 | 599 | −27 | *−4* |
| 700— 799 | *2.6* | 752 | 716 | −36 | *−5* |
| 800— 999 | *3.7* | 874 | 879 | 5 | *1* |
| 1,000—1,499 | *2.1* | 1,136 | 1,158 | 22 | *2* |
| 1,500—1,999 | *0.5* | 1,638 | 1,679 | 41 | *3* |
| 2,000 and over | *0.8* | 3,315 | 3,330 | 15 | ...[*] |
| All incomes | *100* | 443 | 462 | 19 | *4* |

[*] ... indicates less than 0.05 per cent.

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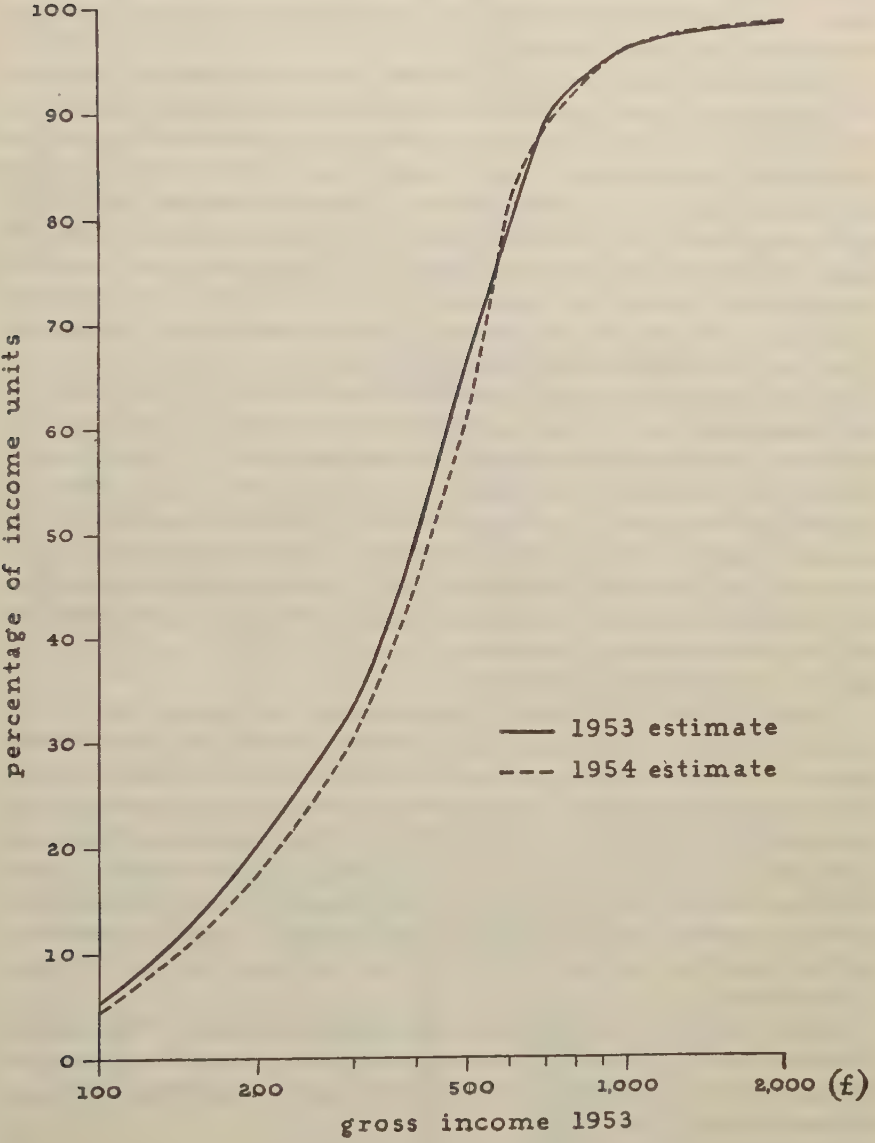
[1] L. R. Klein and P. Vandome, 'Sampling Errors in the Savings Surveys', BULLETIN, Feb. 1957, pp. 92–3.

[2] Twenty-six of the points lay off the diagram but the inclusion of these would not alter the conclusions reached. Their scatter followed the same pattern as in the figure, but at higher incomes. The figure is in two panels, one for lower and one for higher incomes.

Fig. 2

Cumulative Frequency Distributions for Two Estimates of Income



The data of Fig. 1 are summarised in Table XI, where the two estimates are compared by income groups. There is a class control in this table so we are comparing the estimates of an identical set of income units in each class. All except those in the range £600–799 a year gave, on average, a lower figure in 1953, and the mean difference is £19. The percentage differences diminish sharply with rising income, with the absolute differences independent of income level, and not exceeding £55.

There are many individual discrepancies, which are caused by such factors as the omission of a source of income altogether at one or other of the interviews, errors in estimates of income from self-employment, the errors involved in estimating annual income from a weekly figure, as well as the tendency for income change to be underestimated. If the errors are random they will tend to cancel out in the distribution as a whole, and the extent to which this occurs is illustrated in Fig. 2 and Table XII. There is no class control in the comparison between the distributions, and the income units appearing in any particular class will not necessarily be the same in each distribution. If the two distributions were identical it would mean that the individual discrepancies in Fig. 1 exactly cancelled each other out. This is not so, but the comparison is better than the scatter diagrams suggest. From Table XII we see that the 1954 estimate gives up to 2 per cent fewer in the groups below £500 a year. The group with £500–599 a year contains 8.5 per cent more; the next £100 range is 4.1 per cent deficient; while the remaining groups are slightly larger. Although an approximate $\chi^2$ test showed that the distributions are not statistically different at the 10 per cent level of significance, the discrepancies in the middle ranges of income are large, and are associated with the same factors as those leading to points in Fig. 1 to lie above the diagonal line in this range of income.

These tests show that there is a bias in one of the figures, which is most important in the middle income range. Factors contributing to this bias are the greater efforts made in 1954 to include small amounts of interest in income,[1] changes in the rates of social security payments which many respondents forget when estimating their income change, and conservative estimates of the change in the main source of income. The 1953 estimate of 1952 income is probably also biased but any bias is considered small enough to justify its use below for some purposes which are of an illustrative nature. Where 1953 income is required the direct estimate is preferred to that based on an estimate of income change.

When liquid assets are considered the picture is different. The two distributions shown in Table XIII, compare very slightly better than the income distributions in Table XII, using the $\chi^2$ test, but the individual differences are much greater (Table XIV).

Inspection of the questionnaires showed some of the reasons for the inconsistencies. The most important source of error lay in some form of liquid assets not being reported at all in one year, rather than in inconsistent

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[1] See T. P. Hill, *op. cit.*, pp. 132–3.

### Table XII

*Comparison of 1953 and 1954 Estimates of Income Distribution in 1953*

(percentages of income units)

| *Gross income (£) 1953* | *1953 estimate* | *1954 estimate* |
|---|---|---|
| 0— 99 ... ... ... | 5.3 | 4.5 |
| 100— 199 ... ... ... | 15.3 | 13.3 |
| 200— 299 ... ... ... | 12.6 | 12.4 |
| 300— 399 ... ... ... | 16.3 | 15.0 |
| 400— 499 ... ... ... | 17.2 | 15.5 |
| 500— 599 ... ... ... | 12.3 | 20.8 |
| 600— 699 ... ... ... | 11.3 | 7.2 |
| 700— 799 ... ... ... | 2.6 | 3.8 |
| 800— 999 ... ... ... | 3.7 | 4.0 |
| 1,000—1,499 ... ... ... | 2.1 | 2.2 |
| 1,500—1,999 ... ... ... | 0.5 | 0.5 |
| 2,000 and over ... ... ... | 0.8 | 0.7 |
| Total ... ... ... ... | 100 | 100 |

### Table XIII

*Comparison of 1953 and 1954 Estimates of Liquid Assets Distribution in 1953*

(percentages of income units)

| *Liquid assets (£) 1953* | *1953 estimate* | *1954 estimate* |
|---|---|---|
| Nil ... ... ... | 35.7 | 37.3 |
| 1— 49 ... ... ... | 24.9 | 26.0 |
| 50— 99 ... ... ... | 8.6 | 8.6 |
| 100— 199 ... ... ... | 10.2 | 8.0 |
| 200— 399 ... ... ... | 7.4 | 10.7 |
| 400— 599 ... ... ... | 5.5 | 1.9 |
| 600— 799 ... ... ... | 2.4 | 2.1 |
| 800— 999 ... ... ... | 1.9 | 0.6 |
| 1,000—1,499 ... ... ... | 1.3 | 1.8 |
| 1,500—1,999 ... ... ... | 0.7 | 0.8 |
| 2,000 and over ... ... ... | 1.4 | 2.1 |
| Total ... ... ... ... | 100 | 100 |

### Table XIV

*Comparison of 1953 and 1954 Estimates of Liquid Assets in 1953*

| *Liquid assets (£) 1953 1953 estimate* | *Percentage of income units* | *Mean liquid assets (£) 1953* | | *Col. 2—col. 1* | *Col. 2–col. 1 as % of col. 1* |
|---|---|---|---|---|---|
| | | *col. 1 1953 estimate* | *col. 2 1954 estimate* | | |
| Nil | *35.7* | 0 | 13 | 13 | ∞ |
| 1— 49 ... | *24.9* | 16 | 33 | 17 | *106* |
| 50— 99 ... | *8.6* | 69 | 84 | 15 | *22* |
| 100— 199 ... | *10.2* | 132 | 335 | 203 | *154* |
| 200— 399 ... | *7.4* | 290 | 245 | −45 | *−16* |
| 400— 599 ... | *5.5* | 462 | 323 | −139 | *−30* |
| 600— 799 ... | *2.4* | 663 | 759 | 96 | *14* |
| 800— 999 ... | *1.9* | 862 | 708 | −154 | *−18* |
| 1,000—1,499 ... | *1.3* | 1,284 | 1,147 | −137 | *−11* |
| 1,500—1,999 ... | *0.7* | 1,576 | 1,848 | 272 | *17* |
| 2,000 and over ... | *1.4* | 3,447 | 3,135 | −312 | *−9* |
| All income units ... | *100* | 178 | 188 | 10 | *6* |

amounts being reported at the two interviews. A good deal of wilful concealment probably occurred, besides the omission of wives' and children's holdings by mistake. For these reasons it may be thought that the larger of the two figures should be regarded as the more accurate, especially as the mean of liquid assets in the 1953 Survey was £194; this is greater than both our estimates. For some purposes this policy could be adopted, but it must be remembered that the absolute value of liquid assets is not always required. The change in liquid assets is an important component of savings, so that any revision of the 1954 estimate of liquid assets in the previous year will affect the figure for 1954 savings. Here a choice must be made between using the 1954 figure, which is often the less accurate, but which has been edited for consistency with the rest of the 1954 questionnaire, and the 1953 figure which is not necessarily consistent in this way since the 1953 schedules were not referred to during the editing in 1954. As an experiment mean savings, a major component in which is the change in liquid assets, was calculated in three ways, using three different estimates of liquid assets held in 1953 for calculating the change in liquid assets. There were two estimates of liquid assets held at the time of the 1953 interview, one made in 1953 and the other in 1954. The first method used only the information gained in 1954; for the second the 1953 estimate was used, except in a few cases where this was clearly a ridiculous procedure[1]; thirdly, the larger estimate was used, again with some individual exceptions. Mean savings based on these figures, together with the corresponding figure from the 1954 Survey are:

| | *1954 Survey* | *1954 Reinterview Survey* | | |
|---|---|---|---|---|
| | | Method 1 | Method 2 | Method 3 |
| Mean savings (£) ... ... | 11 | 10 | 27 | −15 |

The differences in the three values are so large that no reliable figure for savings can be given, unless it is possible to distinguish one method as more accurate than the others. There is close agreement between Method 1 and mean savings in the 1954 Survey, but it must be remembered that these figures were calculated in the same way, so that agreement may only mean that the method gives consistent results. In addition, however, there are *a priori* grounds for supposing that in calculating savings, where it is the *change* in liquid assets that is relevant, Method 1 is the best. This method does not take account of liquid assets disclosed only at the first interview, but they may well not have changed during the year; further, the method has two important merits. The liquid assets figure for 1953 has been edited for consistency with the other information given at the 1954 interview, and the change in liquid assets is found directly at the interview, and not as the difference of two estimates of liquid assets holdings. From these considerations it was decided that for the purpose of calculating savings Method 1 is best, but that where the actual holding of assets in 1953 is required, as when savings are related to liquid assets in a regression equation, the liquid assets figure calculated by Methods 2 or 3 should be used.

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[1] Such exceptions occurred where the composition of the income unit changed.

Consideration of both income and savings figures brings out the differences between direct estimates and estimates based on changes from year to year. These arise from changes between surveys, such as alterations in definitions and greater efforts to achieve accuracy in some respect, as well as the errors due to faulty memory and reporting on the part of respondents.

## THE USES OF REINTERVIEW DATA

### *Income distributions*

Much is known about the distribution of annual incomes but there is less reliable information about the way in which the income distribution is changing, or about the results of studying incomes over a period other than one year. The 1953 Survey and the 1954 Reinterview Survey provide data on the incomes of the same income units in three consecutive years. One of these figures is remembered over a period of a year and is therefore not as reliable as the other two, but some of the effects of bias in it are assessed and it has been used to illustrate the methods of this section. The span of three years is of particular interest in view of a theory put forward by M. Friedman that it is the ' permanent ' component of income rather than actual income which is the important economic variable in the study of consumer behaviour. This theory will be discussed more fully later, but one of Friedman's conclusions is that a useful definition of permanent income (for the United States) is the average of three consecutive years' income.[1]

*The concentration of income.* A convenient method of comparing income distributions is the Lorenz diagram, summarised by the Lorenz concentration index, $L$. This is a measure that is independent of the scale on which income is measured, and therefore of any inflationary tendency which alters all incomes by the same proportionate amount.[2]

If a satisfactory explicit form of the income distribution can be postulated in terms of a number of unknown parameters, these parameters can be estimated from the empirical data and $L$ calculated in terms of them. Otherwise graphical methods of estimating $L$ must be used. The distribution of gross income is tri-modal in our sample, which in itself suggests that none of the distributions usually considered is satisfactory. The distribution function was plotted on double logarithmic and logarithmic probability paper as tests of the Pareto and lognormal hypotheses respectively, and in each case the curve showed systematic departures from the straight line, which would have been implied by the respective hypothetical law of distribution.[3] Estimates of $L$ were therefore obtained graphically. The method used treated the Lorenz curve as a series of straight lines, and gave slight underestimates (by 1–1½ per cent) of $L$, but the errors in the comparison between different distributions are negligible.

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[1] M. Friedman, *A Theory of the Consumption Function*, Princeton University Press, 1957, pp. 190–191.

[2] $L$ is the ratio of the area between the Lorenz curve and the diagonal of equal distribution to the area of the triangle below the diagonal; it can therefore vary between 0 and 1.

[3] Dorothy Cole and J. E. G. Utting have found in their project on the Social Accounts of Cambridgeshire that the distribution of *net income per person* is approximately lognormal, and the same result holds for the 1954 Reinterview Survey.

The results for annual income in the years covered by the Survey are given in the first four lines of Table XV. They show how the concentration of income in the reinterview sample changed over time. A rough idea of the sampling errors of these estimates of $L$ can be obtained by using the lognormal model. On this hypothesis the standard error of $L$ is about half the standard error of $\sigma$, the standard deviation of logarithm of income. Using the maximum likelihood method of estimation for $\sigma$ the latter figure is about .024, giving a standard error for $L$ of .012. Although the lognormal hypothesis is not fully justified, this figure gives us a guide to the reliability of $L$. We obviously cannot read too much into small changes in concentration, but it is encouraging that the figures for 1953 and 1954 are almost identical. That for 1952 is smaller, and the difference may be attributable to three separate factors. These are sampling errors, the lag of one year involved in calculating income for 1952 and any genuine change in concentration. (Of course, the close agreement between the results for 1953 and 1954 does not mean there was no change in concentration between 1953 and 1954; such a change may be masked by sampling fluctuations.) A check on the effect of memory error is possible since income for 1953 can be calculated in two ways. Using the 1953 estimate gives $L = .331$[1] while the 1954 estimate gives $L = .327$. This shows a slight bias and suggests that a figure for 1952 properly comparable with the other years may be slightly larger than the value of .320 in Table XV.

A genuine change in concentration may reflect either a change in the distribution of income in the community or a change specific to the particular sample studied. The principal change specific to the sample is its change in average age. Unlike the community as a whole the reinterview sample is closed, in the sense that there was no 'fresh blood' being introduced at the bottom of the age (and income) scales and no income unit which had disappeared through death by 1954 is considered in the earlier years. It is known that the dispersion of incomes increases with age, in the same way as the spread of competitors in a motor race tends to increase in the later stages. Consideration of the income distributions within age groups in the 1953 Survey showed a definite tendency for variance to increase with age. A change in concentration of not more than 2 per cent in two years would be consistent with these data. This change could explain part of an increase in concentration between 1952 and 1954. It is not possible to make any firm statements about changes in concentration in the community from these data because the change between 1952 and 1954 after the age effect has been allowed for is small compared with the sampling errors.

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[1] The discrepancy between this figure and that in Table XV is explained by the fact that, to ensure comparability, units where the 1954 estimate of 1953 income was not ascertained have been excluded from the present calculation. Also excluded from all the calculations in this section are units where 1952 income was not ascertained; this explains why yet a third figure (for the whole sample) is quoted on p. 75.

TABLE XV

*Concentration Indices for Income*

| *Type of Income* | *Period* | *Concentration index* |
|---|---|---|
| Net | 1 year —1954 | .302 |
| Gross | ,, —1954 | .328 |
| ,, | ,, —1953 | .327 |
| ,, | ,, —1952 | .320 |
| ,, | ,, —average 1953/54 | .328 |
| ,, | ,, —average 1952/53/54 | .326 |
| ,, | 2 years 1953–54 | .320 |
| ,, | 3 years 1952–54 | .313 |

Of more interest than the differences between one year periods are comparisons between the concentration of income in different lengths of time. As a standard of comparison for longer accounting periods, averages of the concentration of annual income have been made for two and three year periods. It is possible to formulate various types of average and the one adopted here is that which is easiest to compute. It consists in averaging, over two or three years, the proportion of income and income units in each of the standard income classes and calculating the corresponding concentration.[1] These averages remove the effect of any systematic change in concentration, so that the difference between an average annual figure, and the concentration for a longer accounting period is attributable to reranking of incomes between years.[2] The picture is clearest when the two year period 1953–54 is considered. The concentration indices for the separate years were almost the same, while that for the two year period was $2\frac{1}{2}$ per cent smaller. Thus the overall distributions were practically the same in the two years, insofar as we assume the distribution to be characterised by its concentration index,[3] but some income units with low incomes in 1953 moved up the scale in 1954 and *vice versa*. It is only commonsense that reductions in concentration will occur; the purpose of this analysis is to attempt to measure them and relate them to one another. A possible standard of reference is provided by direct taxation, which also reduces inequality in the income distribution. The effect of taxation is of course mainly on the high incomes, whereas the effect of adding years is spread over the whole distribution more evenly. In 1954 the reduction in $L$ due to taxation amounted to 8 per cent in our sample.

To obtain a three year accounting period we must again use the estimate of 1952 income, and it is worthwhile to consider what bias, if any, is likely

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[1] *Cf.* F. A. Hanna, J. A. Pechman and S. M. Lerner, *Analysis of Wisconsin Income*, Conference on Research in Income and Wealth, Studies Volume Nine, National Bureau of Economic Research, New York, 1948, pp. 204–9. The method of averaging used in this study was to combine equivalent five-percentile groups.

[2] Reranking always reduces concentration for the longer period compared with the average annual figure. See F. A. Hanna, J. A. Pechman and S. M. Lerner, *op. cit.*, p. 212.

[3] This is reasonable since either on the Pareto or lognormal hypothesis there is a one-one correspondence between $L$, and the distribution parameter other than that determining the scale.

TABLE XVI

*Two Estimates of Change in Income*

(percentages of income units)

| *Difference between incomes reported in 1953 and 1954* | *Change in income reported in 1954* *minus* | | *no* | *plus* | | *not ascer-* | *Total* |
|---|---|---|---|---|---|---|---|
| | *£50 and over* | *£1–50* | *change* | *£1–50* | *£50 and over* | *tained* | |
| Minus £50 and over | 6.0 | 1.6 | 3.6 | 1.7 | 0.3 | — | 13.2 |
| ,, £1—49 | 1.4 | 3.6 | 7.4 | 2.9 | 1.8 | 0.7 | 17.8 |
| Plus £0—49 | 0.1 | 1.8 | 12.1 | 12.7 | 3.3 | 1.1 | 31.0 |
| ,, £50 and over | 0.9 | 1.9 | 6.9 | 14.1 | 13.6 | 0.6 | 38.0 |
| Total | 8.5 | 8.9 | 29.9 | 31.3 | 19.1 | 2.3 | 100 |

to be introduced into the results by its use. The reduction in concentration in a longer accounting period compared with the average annual figure is due to reranking of incomes. Evidence from the two estimates of change in income between 1953 and 1954 suggests that the effect of memory error is to underestimate the reranking, and hence to overestimate the concentration for the longer period. The sample was classified by ' actual change ' in income (the difference between income reported at the two interviews), and ' remembered change ' (the change in income reported at the second interview). Table XVI, and the more detailed results from which it was derived, show many zero and small positive remembered changes corresponding to large actual changes. Thus we find more people in about the same position in the income hierarchy in 1953 and 1954 on the basis of remembered change than with actual change. We should therefore expect that concentration in the two year period 1953–54 would be closer to the average annual figure if the remembered value for 1953 income were used. If the same holds true for 1952 it follows that the value in Table XV for the three year period is probably higher (relative to the average annual figure) than it would be if an estimate of 1952 income obtained in the same way as those for 1953 and 1954 could have been used. The units where an estimate of 1952 income was not ascertained are a potential source of bias but this was avoided by discarding them from all the calculations summarised in Table XV.

When three years are taken as one accounting period, the reduction in concentration over the average for the yearly distributions is 4 per cent. The reshuffling of incomes which occurs over a period of three years thus reduced concentration by half as much as direct taxation reduced the concentration of annual income. This is illustrated in Fig. 3. (The use of taxation as a standard of reference should not be taken to imply that the temporal process can be regarded in any way as a *substitute* for taxation. There will of course be a corresponding reduction in the concentration of net income in the longer period.) Provided certain very exceptional conditions[1] do not hold for the additional year, the concentration for an accounting period of $n+1$ years will be less than that for $n$ years. In addition, as the accounting period becomes

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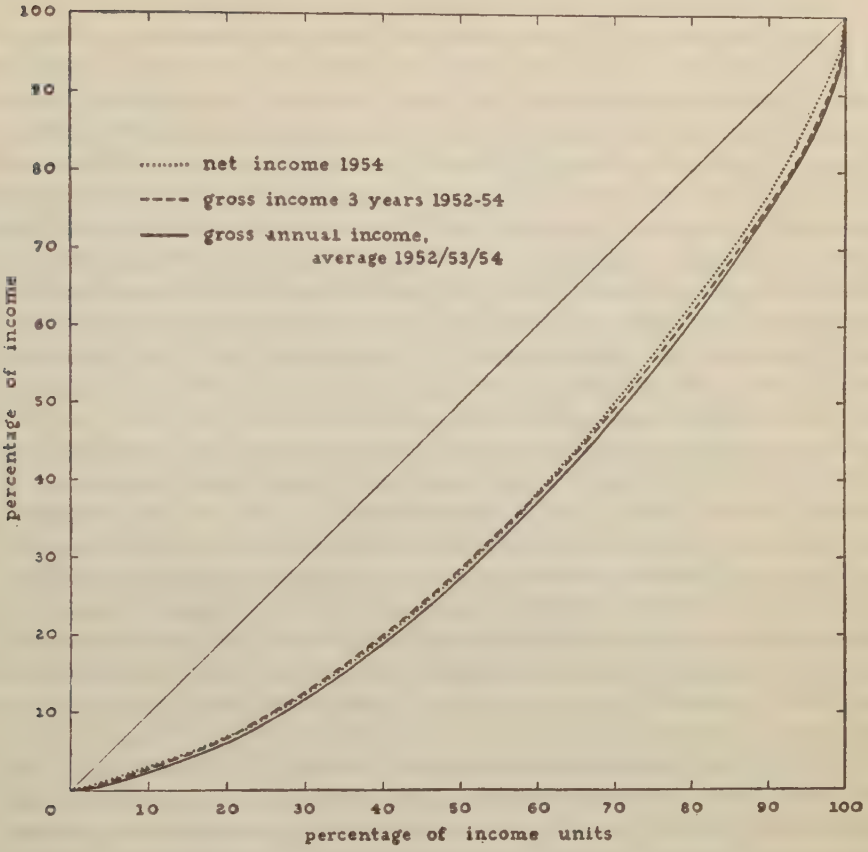
[1] See F. A. Hanna, J. A. Pechman and S. M. Lerner, *op. cit.*, p. 214.

Fig. 3

Lorenz Diagram for Income



longer, the effect of an additional year will usually diminish. So long as there is not a consistent and pronounced trend towards equality or inequality we should expect the Lorenz curve to reach a limit as the accounting period is increased; a limit which lies between the diagonal of equality and the least equal annual curve. The period for which this occurs would be a more fundamental one for the measurement of income than the arbitrary (but convenient) period of a year which is normally adopted. Since there is a change in our data in going from two years to three, which may be underestimated because of bias in the 1952 figures, it appears that the limit will not be approached in less than three years.

*Stationary distributions for income.*[1] One way of regarding an income unit's income in successive years is to suppose it is determined by a stochastic process in which income in any year depends on past income and on a random element. The simplest such process applicable to discrete variables like annual income is the Markov chain. By using this model we can make deductions about how the income distribution is evolving over time.

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[1] I am grateful to Professor D. G. Champernowne for helpful suggestions and criticisms of this section.

A full discussion of Markov chains is given by Feller,[1] but, briefly, a Markov process is a stochastic process in which the state of the system at time $t$ depends only on the state at time $t-1$ and a set of conditional probabilities, $p_{ij}(t-1)$, of state $j$ at time $t$, given state $i$ at time $t-1$. Following Feller, a Markov process is termed a Markov chain if the $p_{ij}(t-1)$ are constant over time. In the present context this means assuming that income in any year depends on income in the previous year, but not on any earlier situation, and that the transition probabilities governing movement from one income class to another are constant over time. Neither of these assumptions is realistic but they yield a simple model, the use of which gives us some insight into the way income distributions evolve. We can take account of the ' shuffling ' process which takes place from year to year, even though in the whole population the shuffling may largely cancel out.

The theory of Markov chains shows that under certain conditions the distribution will tend to a limit, the stationary or ergodic distribution, which depends on the matrix of transition probabilities, but not on the initial distribution. For an income distribution with a finite number of classes the important condition for stationarity is that the chain should be irreducible,[2] *i.e.* there is no sub-set of classes the probability of leaving which is zero. A simple sufficient condition is that for any income class except the lowest and highest it is possible to move either up or down one class in the subsequent year; and that for the extreme classes it is possible to move to the adjacent class.

Professor Champernowne has developed the theory of this subject and has shown how a Markov chain such that, for incomes above a minimum value, the probability of a given proportionate change in income is independent of the actual level of income, may tend to a stationary distribution of the Pareto form.[3] Aitchison and Brown have suggested a modification of Champernowne's model leading to a lognormal distribution.[4] R. Solow has also used the Markov model in the study of income distributions, allowing for regular alternation of the transition probabilities corresponding to good and bad years in a business cycle.[5] The development of these theories has been handicapped by the lack of suitable data and it is worthwhile to consider what can be achieved by using the reinterview data in an empirical investigation into the stationary distributions implied by current changes in income. If the transition matrix has remained constant a comparison of the stationary and initial distributions indicates the extent to which the process has approached its limit. This is only one purpose for which such data could be used, and is merely intended to illustrate a method. A larger sample, covering a longer period would be valuable for testing the relevance to the real world of theories such as Champernowne's, and perhaps for suggesting modifications to the assumptions involved in them.

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[1] W. Feller, *An Introduction to Probability Theory and Its Applications Vol. 1*, Wiley, 1950, Chap. 15.

[2] Sufficient conditions are irreducibility and aperiodicity; *cf.* W. Feller, *op. cit.*, pp. 324–9.

[3] See D. G. Champernowne, ' The Theory of Income Distribution ', *Econometrica*, October 1937, pp. 379–381; and 'A Model of Income Distribution ', *Economic Journal*, June 1953, pp. 318–351. In ' The Generation of Income Distributions: Some Illustrative Models ', *The Incorporated Statistician*, April 1957, pp. 161–5, the same author summarises the theories of a number of writers.

[4] J. Aitchison and J. A. C. Brown, ' On Criteria for Descriptions of Income Distribution ', *Metroeconomica*, December 1954, pp. 88–107; and *The Lognormal Distribution*, Cambridge, 1957, pp. 108–9.

[5] R. Solow, ' Some Long-Run Aspects of the Distribution of Wage Income ', *Econometrica*, July 1951, pp. 333–334.

The transition probabilities for the Reinterview Survey were based on the actual transitions between twelve standard income classes. Three matrices based on gross income were estimated. Two were for the change from 1952 to 1953 and from 1953 to 1954, and the third was an average of these two.[1] One of the matrices (that for 1952/53) was found to be reducible, and led to a situation where all income units moved into one of the top three income groups. This was discarded but the information contained in it is used in the average matrix. Stationary distributions were calculated for the others in two ways. First, actual income was used, so that the relative levels of income in the two years influenced the final distributions. Second, income was scaled so as to make mean income in the two years identical; this was done by increasing 1952 and 1953 income by 8 and 9 per cent respectively.

It is unrealistic to expect the transition matrix to remain constant in time in the former case if there is a general rise in incomes, for we may expect transition probabalities to remain constant (if at all) for the same relative position in the distribution rather than the same absolute range of income. The results for unadjusted income are not of much interest in themselves, but are presented as a standard of comparison to demonstrate the effect of the adjustments. The object of the adjustments is to isolate the more fundamental processes affecting incomes from the general increase, and it is possible to think of several ways of attempting this. The method used here means that the adjusted incomes do not represent real incomes (one of the possible alternatives), as changes in prices are not allowed for. It was chosen for three reasons: first, the computations were simple; second, we are here more interested in changes in the relative distribution of incomes than in how much a given income will buy; third, it was considered of interest to find the stationary distribution under this particular condition.

Table XVII shows the solutions of the four ergodic chains. With a small sample and 144 parameters to estimate (over half the estimates of the probabilities were zero) the results will obviously not be very reliable. A comparison between the results for 1953/54 and the average of 1952/53 and 1953/54 gives us some idea of the effect of sampling errors and of bias in the 1952 figures. For both the adjusted and unadjusted incomes the comparison is fair for

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[1] This was formed by averaging the unconditional transition probabilities for 1952/53 and 1953/4 and then scaling to give conditional probabilities.

TABLE XVII

*Stationary Distributions for Gross Income*

(percentages of income units)

| *Gross income (£)* | *1953/54* | | | *Average of 1952/53 and 1953/4* | | |
|---|---|---|---|---|---|---|
| | *1953 distribution* | *1954 distribution* | *stationary distribution* | *year 1 distribution* | *year 2 distribution* | *stationary distribution* |
| **Unadjusted income** | | | | | | |
| 0— 99 | 5.3 | 3.4 | 0.4 | 4.8 | 4.0 | 1.0 |
| 100— 199 | 15.3 | 14.1 | 2.8 | 14.6 | 14.4 | 4.3 |
| 200— 299 | 12.6 | 12.4 | 4.1 | 13.3 | 12.5 | 4.6 |
| 300— 399 | 16.3 | 15.8 | 6.1 | 17.7 | 16.5 | 6.7 |
| 400— 499 | 17.2 | 13.0 | 8.3 | 19.1 | 15.2 | 8.8 |
| 500— 599 | 12.3 | 15.5 | 10.8 | 12.2 | 14.5 | 10.3 |
| 600— 699 | 11.3 | 13.5 | 12.7 | 9.4 | 11.8 | 11.3 |
| 700— 799 | 2.6 | 3.5 | 3.4 | 2.2 | 2.8 | 3.1 |
| 800— 999 | 3.7 | 4.5 | 7.0 | 3.6 | 4.3 | 10.1 |
| 1,000—1,499 | 2.1 | 3.0 | 12.6 | 1.8 | 2.6 | 16.4 |
| 1,500—1,999 | 0.5 | 0.4 | 4.5 | 0.5 | 0.4 | 4.6 |
| 2,000 and over | 0.8 | 1.0 | 27.3 | 0.8 | 0.9 | 18.7 |
| **Adjusted income*** | | | | | | |
| 0— 99 | 3.5 | 3.4 | 3.4 | 3.5 | 3.3 | 3.4 |
| 100— 199 | 13.6 | 14.1 | 13.9 | 12.6 | 13.2 | 13.9 |
| 200— 299 | 12.5 | 12.4 | 11.5 | 12.0 | 12.4 | 12.4 |
| 300— 399 | 15.3 | 15.8 | 15.3 | 17.1 | 16.3 | 13.9 |
| 400— 499 | 17.1 | 13.0 | 11.4 | 16.0 | 14.9 | 12.1 |
| 500— 599 | 11.2 | 15.5 | 14.6 | 13.9 | 14.0 | 12.0 |
| 600— 699 | 13.3 | 13.5 | 13.3 | 12.0 | 13.4 | 12.6 |
| 700— 799 | 4.5 | 3.5 | 3.1 | 4.7 | 3.6 | 3.2 |
| 800— 999 | 5.1 | 4.5 | 3.7 | 4.5 | 4.7 | 6.0 |
| 1,000—1,499 | 2.6 | 3.0 | 4.3 | 2.4 | 2.8 | 6.3 |
| 1,500—1,999 | 0.5 | 0.4 | 0.9 | 0.5 | 0.5 | 1.2 |
| 2,000 and over | 0.8 | 1.0 | 4.6 | 0.9 | 0.9 | 3.0 |

*Income in 1952 and 1953 was scaled to make the means the same as that for 1954.

incomes up to £800; above this figure the proportionate discrepancies are large. Despite the large sampling and reporting errors[1] the difference between using adjusted and unadjusted income is still greater.

Unadjusted income gives stationary distributions very different from the current distributions. Not only are half the incomes over £800, but the distribution is uni-modal (apart from a deficiency in the range £700–799). The mode is in the range £600–699, but the distribution is more dispersed, and there are only two £100 intervals containing over 10 per cent of income units. It is pretty clear that long before such a situation is reached our empirical transition probabilities would have ceased to apply. The adjustments involved in scaling income so as to keep the means constant have the effect of making the stationary distributions much more similar to the current distributions. Below £1,000 they are remarkably alike, and above £1,000 the increase is substantial but much smaller than that for unadjusted income. The shape of the distribution remains the same, and in particular it is still tri-modal. Such changes as do occur are in an upward direction, and the median of the stationary distribution is about £450 compared with about £430 in the initial distributions. The concentration of the stationary distribution for adjusted income is larger than that of the current distributions. It was assumed for the former that class means were the same as in 1954, but except for the highest class this is not a strong assumption, while for the highest class the form of the distribution indicates the mean will be higher than in 1954, so that the conclusion that concentration increases should apply *a fortiori* if we could use the true class means. An approximate calculation shows a concentration index for the stationary distribution of .41, an increase of 24 per cent on the 1954 value. There is an obvious respect in which the transition matrices do not reflect the real-world situation; there is no allowance made for new incomes to appear when young people start work, or for incomes to drop to zero through death, although it is possible for an income to drop substantially through retirement. This has been referred to above (p. 86), and is inherent in the method of choosing the sample. A correction for births and deaths could have an appreciable effect on the results in the direction of reducing incomes in the stationary distribution; it would also reduce the concentration of the distribution.

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[1] Part of the differences noted above may be due to genuine changes in the process (*i.e.* in the transition probabilities) between 1952 and 1954, and not to errors.

The results so far do not take account of direct taxation. It is not possible to apply progressive tax rates to the stationary distribution of adjusted incomes, which are measured on some unknown scale, but the direct method of calculating the stationary distribution of net income is available. This has been done for adjusted income, *i.e.* net income scaled to make mean gross income constant, for 1953/54. If the changes made in the tax system in 1953 were repeated each year, and the same assumptions as were made for gross income are applied, the distribution in Table XVIII would result. It is very similar to the initial distributions, but there is a slight upward tendency which is reflected by a very small increase in the Lorenz index.

TABLE XVIII

*Stationary Distribution for Adjusted Net Income**

(percentages of income units)

| *Net income (£)* | *1953 distribution* | *1954 distribution* | *Stationary distribution* |
|---|---|---|---|
| 0— 99 ... ... | 3.5 | 3.4 | 3.1 |
| 100— 199 ... ... | 15.9 | 15.7 | 14.7 |
| 200— 299 ... ... | 13.2 | 12.9 | 12.7 |
| 300— 399 ... ... | 15.1 | 17.4 | 18.1 |
| 400— 499 ... ... | 18.3 | 13.5 | 11.8 |
| 500— 599 ... ... | 14.5 | 19.4 | 19.9 |
| 600— 699 ... ... | 9.1 | 7.5 | 8.3 |
| 700— 799 ... ... | 4.0 | 4.1 | 4.7 |
| 800— 999 ... ... | 3.6 | 3.9 | 4.3 |
| 1,000—1,499 ... ... | 1.8 | 1.2 | 1.0 |
| 1,500—1,999 ... ... | 0.3 | 0.6 | 0.9 |
| 2,000 and over ... ... | 0.5 | 0.4 | 0.5 |

*Net income in 1953 is scaled by a factor which makes mean gross income in 1953 the same as that in 1954. This factor gives an adjusted mean net income in 1953 £2 lower than that in 1954, reflecting the tax concessions granted in 1953.

Close similarity between the initial and stationary distributions indicates that the current distributions are near an equilibrium state, *i.e.* the changes implied by the transition matrix have largely worked themselves out. Our results for gross and net income differ in this respect, as the former show a substantial expansion of the higher income classes, (and a 24 per cent increase in inequality), while the latter is near its equilibrium position. A correction for births and deaths would probably reduce this discrepancy because the drop in gross income when a person with a high income dies, and is replaced by an heir, is likely to be much greater than the drop in net income. Nevertheless the tools used here must be regarded as fairly crude ones. The balance of the evidence seems to be that changes in incomes in the period considered were such as lead to some increase in inequality but it is possible that the correction for births and deaths would not only reduce the trend towards greater inequality, but reverse it.

Aitchison and Brown[1] have pointed out that an objection to some of the suggested stochastic models of income generation is that they lead to increasing variance in the distribution, and this is contrary to the actual state of affairs. Kalecki[2] has suggested a process which leads to a lognormal distribution with constant variance by postulating a negative correlation between income and the expected proportionate change in income. It remains a point of interest as to whether or not there is anything inherent in the process determining income which results in increasing variance. If so, it must be counteracted by autonomous factors such as government policy, but if not, any stochastic model must lead to stable variance[3] if it is to be regarded as realistic. Using a finite transition matrix we cannot get ever increasing variance since, (given the ergodic property), it must lead to a stationary distribution. However, Professor Champernowne has pointed out that a process which would result in increasing variance with an infinite matrix would produce an unusual distribution when the matrix is finite. This is likely to be U-shaped, rather than ∩-shaped. In fact, the stationary distributions obtained here are the same general shape as the initial distribution, and there is no evidence of any explosive tendencies in the empirical process.

In a more refined analysis of this sort it would be necessary to have more accurate estimates of the transition probabilities, especially in the highest ranges of income, and also to subdivide the open-ended range of £2,000 and over. This is important since changes in the upper tail of the distribution have an effect on the concentration disproportionate to the numbers involved. Additional factors which should be taken into account are the effects of births and deaths and autonomous changes, especially changes in taxation if net income is studied. Professor Paish[4] has illustrated the effects of changes in tax rates since 1938, the general increase in the level of incomes which has taken many incomes into ranges of higher marginal rates of tax, and changes in prices, as well as the effects of redistribution. These factors can vary considerably from year to year and must be taken proper account of in any thorough study of the evolution of the income distribution.

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[1] J. Aitchison and J. A. C. Brown, *op. cit.*, p. 109.

[2] M. Kalecki, ' On the Gibrat Distribution ', *Econometrica*, 1945, pp. 161–170.

[3] The variance of income will necessarily increase if all incomes increase by a constant factor. A more useful criterion is therefore stability of the variance of logarithm of income.

[4] F. W. Paish, ' The Real Incidence of Personal Taxation ', *Lloyds Bank Review*, January 1957.

The stationary distributions presented here should not be regarded as a prediction of any future situation. This qualification would apply even if we knew that the assumption that income depends only on income in the previous year were a good approximation to the real situation, and if the sample were large enough for us to ignore errors of estimation. Predictions could only be made if we felt justified in assuming that the transition probabilities are constant in time. The stationary distribution should therefore be regarded as a device for giving us a better understanding of the changes which have occurred, by showing the results which would follow if current movements between income classes were repeated indefinitely.

### *Savings and durables expenditure*

A reinterview sample provides us with economic and attitudinal information of a kind which is often considered to be of importance when savings behaviour is being investigated, but which is usually not available from other sources. We can consider accounting periods longer than one year, and can investigate stationary distributions in the same way as in the previous section; in addition attitudes can be related to *subsequent* savings behaviour. The use of prior attitudes points to methods which may be useful in predicting, in a rough and ready way, future trends in savings.

The accuracy of the statistics on savings and related variables has already been discussed. It is to be expected that a small sample will be less accurate than the main Surveys. However, the reinterview sample was found to be no worse than might be expected and there are sufficient grounds for believing that the data warrant the fairly general conclusions drawn in this section.

*The influence of attitudes.* Among the information gathered in 1953 were answers to the following questions:

> *Are you better or worse off financially now than a year ago?*
>
> *In the coming year do you expect your income to be larger, about the same or smaller?*
>
> *Do you think you will be better or worse off during the coming year?*

These answers, together with information about changes in income, have been used in an attempt to relate actual behaviour to attitudes, especially attitudes at the beginning of the year for which savings are subsequently known.

It is necessary to minimise the effect of income since savings and durables expenditure are closely related to income, and instead of savings and durables expenditure we use their ratios to net income. Durables expenditure is roughly proportional to income, so taking the ratio as the variable will largely remove the income effect. The same does not apply to savings, as the proportion of income saved has been found to increase with income,[1] so we split the savings tabulations into three income classes.

TABLE XIX

*Total Savings as Percentage of Net Income 1954 by Attitudes 1953*

(averages of percentages)

| *Attitudes 1953* | *Gross income 1954 (£)* 0—399 | 400—799 | 800 and over |
|---|---|---|---|
| **Feeling better or worse off** | | | |
| Better ... ... ... ... | −0.4 | −5.7 | 13.6 |
| Same ... ... ... ... | −1.3 | 4.9 | 1.7 |
| Worse ... ... ... ... | −8.4 | 4.6 | 6.6 |
| **Expects to be better or worse off** | | | |
| Better ... ... ... ... | −1.9 | −3.0 | 7.8 |
| Same ... ... ... ... | −9.1 | 0.9 | 10.2 |
| Worse ... ... ... ... | −1.3 | 4.4 | 10.8 |
| Not ascertained ... ... ... | −0.1 | 8.7 | 6.6 |
| **Income expectations** | | | |
| Larger ... ... ... ... | −2.7 | 5.6 | 8.6 |
| Same ... ... ... ... | −6.4 | 4.0 | 6.5 |
| Smaller ... ... ... ... | 0.4 | −35.3 | 17.7 |
| Not ascertained ... ... ... | −0.3 | 3.2 | 21.1 |
| All income units with known savings* ... ... ... ... | −4.4 | 1.5 | 8.8 |

*These income units form 96 per cent of the sample.

TABLE XX

*Durables Expenditure (£10 and over) as Percentage of Net Income 1954*

(averages of percentages)

| *Attitudes 1953* | *Feeling better or worse off* | *Expects to be better or worse off* | *Income expectations* |
|---|---|---|---|
| Better (or larger) ... ... ... | 10.5 | 9.3 | 6.0 |
| Same ... ... ... ... | 2.9 | 5.0 | 3.9 |
| Worse (or smaller) ... ... | 3.8 | 3.4 | 14.6 |
| Not ascertained ... ... ... | — | 2.1 | 3.8 |
| All income units ... ... ... | 5.2 | 5.2 | 5.2 |

If we consider the three attitudinal variables one at a time we do not find any clear and consistent pattern emerging, although there are several points of interest. Taking savings first, it is evident that a single attitude is not a reliable guide to savings, and this is only to be expected. On the other hand one or two general tendencies can be detected in Table XIX. Those who are pessimistic about their future tend to save more than those who are optimistic. When income units are classified according as they felt better or worse off at the beginning of the year, in two income groups those feeling better off saved more than those feeling worse off, but in the middle range of incomes the opposite occurred. Table XX shows similar inconsistencies for durables expenditure, though here again there is a slight tendency for the optimistic income units to spend a greater proportion of income on durables than the pessimists.

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[1] See, for example, L. R. Klein, 'Patterns of Savings: the Surveys of 1953 and 1954,' BULLETIN, May 1955, p. 179 Table III.

These figures are unreliable guides both because they have large sampling errors and because the attitudes considered singly are at best only a partial indication of the economic well-being and prospects of the income units. In order to get over the latter difficulty a composite classification was tried, using information on the three attitudes, income change reported in 1953 and the change in income between the two interviews. The sample was divided into four groups:

(i) Those favourable in at least one variable, and unfavourable in none. Favourable in this context means having a positive income change (of £20 and over), feeling better off, expecting to be better off, or expecting an income increase.
(ii) Those neutral in all five variables. Neutral means ' same ', ' not ascertained ', or an income change of less than £20.
(iii) Those unfavourable in at least one variable and favourable in none.
(iv) Those both favourable and unfavourable.

TABLE XXI

*Savings and Durables Expenditure in 1954 by Composite Attitudes*

| *Attitudes and changes in income** | *Percentage of income units* | *Average percentage of net income saved †* | *Average percentage of net income spent on durables* | *Mean net income 1954 (£)* |
|---|---|---|---|---|
| Favourable ... ... ... | 31 | 2.8 | 6.0 | *504* |
| Neutral ... ... ... ... | 4 | 1.9 | — | *197* |
| Unfavourable ... ... ... | 23 | −1.9 | 3.6 | *295* |
| Favourable and unfavourable ... | 43 | −2.4 | 6.0 | *484* |

*The attitudes used and the methods of classification are described in the text.
† Figures in this column refer to all income units with known savings, *i.e.* 96 per cent of the sample.

It is a disadvantage of this method that the mixed group, from which no conclusions can be drawn, is large, comprising almost half the sample. This fact, together with the small size of the original sample means that it is impracticable to subdivide further into income classes for the analysis of savings. This difficulty could of course be overcome in a larger sample. Setting aside the mixed group we find that those classified favourable put a larger proportion of their income into savings and durables than those unfavourably placed. The neutral group is very small, but it shows a level of savings between the other two groups. The effect of income on these figures must be assessed before an optimistic outlook can be associated with a relatively high degree of savings. Since the sample is too small to allow a division into income classes, a comparison was made between the favourable and unfavourable groups in Table XXI, and all income units with similar incomes. There is a difference of £200 in the average net income between income units with favourable and unfavourable attitudes and this will, in part at least, account for the difference in savings; the question is whether it accounts for all the difference. If we take all income units with a gross income of £400–699 we find an average net income of £516 and an average savings ratio of 1.3 per cent. The group compares closely in income with those with favourable attitudes but it saves at only half the rate. Similarly those with gross incomes of £200–399 have a mean net income of £291 and a savings ratio of 0.1 per cent, compared with a net income of £295 and 1.9 per cent of income *dissaved* by those with unfavourable attitudes. This comparison suggests that attitudes are in fact associated with savings and that optimistic, favourably placed, people will save more than those with a similar income, but expecting a deterioration in their position. A weakness of the comparison, however, is that although we compared groups with similar *average* incomes, they did not have the same *distribution* of incomes. There is (presumably) greater dispersion of incomes in the groups of Table XXI than in the income groups of £200–399 or £400–699 and this will tend to exaggerate the differences in savings reported above.

TABLE XXII

*Savings-Income Ratios by Degree of Economic Well-Being*

| *Degree of economic well-being** | *Percentage of income units with known savings* | *Average percentage of net income saved* | *Net income (£)* |
|---|---|---|---|
| **Favourable in:** | | | |
| 5 categories ... ... ... | 2.5 | 14.5 | *521* |
| 4 or more ... ... ... | 9.7 | 5.9 | *548* |
| 3 or more ... ... ... | 15.8 | 7.0 | *524* |
| 2 or more ... ... ... | 24.3 | 4.8 | *538* |
| 1 or more ... ... ... | 30.5 | 2.8 | *504* |
| **Unfavourable in:** | | | |
| 4 or more ... ... ... | 3.0 | 1.9 | *244* |
| 3 or more ... ... ... | 4.2 | 0.1 | *355* |
| 2 or more ... ... ... | 12.9 | −0.5 | *302* |
| 1 or more ... ... ... | 22.5 | −1.9 | *295* |

*The five categories used in this classification are: income change 1953; income change, 1954; feeling better or worse off, 1953; expects to be better or worse off in coming year, 1953; and income expectations, 1953.

The analysis can be cast in a slightly different form and one which gives firmer grounds for supposing that attitudes can be related to savings. In Table XXII the categories of Table XXI are subdivided according to degree of favourability by separating out those with a positive response in all five of the classifications, in at least four, etc. These results show a far more consistent pattern than those for attitudes taken singly. In this form we see that the higher savings ratio for those optimistically inclined does not mean that the ratio decreases as pessimism increases. In fact the opposite is true, but the rate of savings is always higher for a given degree of optimism than for the same degree of pessimism. Among the optimistic groups there is little variation of income, so the differences in savings cannot be attributed to an income effect. There is more income variation among the pessimistic groups, but it is not large or consistent enough to account for the steady increase in the percentage of income saved.

Although the extremes in both groups show a tendency to save more, the motivation for this is presumably not the same. The faster a person is going up the economic scale the less may his commitments be adjusted to his current income. The result of this disequilibrium will be a higher level of savings than that of someone who has been receiving the same income for several years. On the other hand those whose positions are declining will try to save, despite the difficulty, if further falls in (real) income are anticipated. It is possible to make out a plausible case for just the opposite behaviour, on the grounds that people may anticipate income changes and increase their commitments to a level which cannot be maintained if their expectations are not fulfilled. Findings such as those presented here therefore have a use in helping us to determine which kind of behaviour predominates in a given situation, besides indicating methods by which the relative numbers of income units in disequilibrium may be measured and hence some predictions made about future savings. Apart from income change between the two interviews[1] all the information used is available at the beginning of the year, so that shifts in the distribution of income units between the classes of Table XXI could be used as a means of forecasting the way in which savings will move in the subsequent year.

In a larger sample a possible refinement would be to take account of the reasons given for income expectations and similar attitudes. It may be, for example, that people anticipating a general wage increase tend to dispose of additional income in a different way than those expecting a rise specific to themselves through promotion or a change in job.

*Savings over different accounting periods.* The distributions of savings over time periods of one and two years are interesting in relation to certain theories of the consumption (and therefore savings) function. A theory has been put forward by M. Friedman that savings are proportional to what he describes as 'permanent income'.[2] If various limiting assumptions are made a variety of data can be used to test its validity. Where survey data are required the main Savings Surveys are usually more suitable than the Reinterview Surveys because they contain a larger number of observations,[3] but data on the savings of an identical set of income units in two consecutive years are available only in the latter.

The Friedman theory in its most general form postulates

$$\begin{aligned} c_p &= k\,y_p \\ c &= c_p + c_t \\ y &= y_p + y_t \end{aligned}$$

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[1] This variable could be replaced by the unit's expectation of future income at the beginning of the period.

[2] M. Friedman, *op. cit.*, Ch. III. For a summary of some aspects of the theory see M. R. Fisher, 'Explorations of Savings Behaviour' BULLETIN, August 1956, pp. 226–228.

[3] See, for example, M. R. Fisher, *op. cit.*

where

$c$ = consumption
$y$ = income
$c_p, y_p$ = permanent components
$c_t, y_t$ = transitory components

and $k$ is a function of the rate of interest and the consumer's wealth and tastes, but is independent of $y_p$. In this form no empirical test is possible as $c_p$ and $y_p$ are not directly observable magnitudes. Friedman does not lay down strict definitions of these variables, but by making certain assumptions he is able to design tests of the hypothesis. His basic assumptions concern the correlations of the permanent and transitory components, *i.e.*

$$\rho(y_p y_t) = \rho(c_p c_t) = \rho(c_t y_t) = 0,$$

but for several purposes he makes the additional assumption that the transitory components will tend to cancel out over time for an individual. In fact for some purposes he uses a definition of the permanent components in terms of a ' horizon ' over which the transitory components may be supposed to cancel out.[1] It follows from this that income over two years will be a better measure of permanent income than that for only one year. Friedman claims we should expect to find a smaller correlation between income and the ratio of savings (or consumption) to income over the longer period, since according to the theory the ratio of the permanent components is a constant and therefore uncorrelated with income.

Friedman quotes evidence from the 1949 reinterview sample of the Survey of Consumer Finances in the U.S.A. in the form of multiple correlation coefficients from regressions of the ratio of income saved on the logarithm of income per person and the ratio of liquid assets to income. These show a smaller correlation over the two year period than over one year, for both home owners and renters.[2] The average fall in the correlation when the two year period is taken, for the two categories, is 43 per cent, and Friedman claims this evidence is consistent with his hypothesis.[3] A similar calculation was made from the 1954 Reinterview Survey. Regression equations of the savings-income ratio on gross income were estimated for the one and two year periods using grouped data,[4] equations being estimated for both twelve month periods as suggested by Fisher.[5] The results were:

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[1] M. Friedman, *op. cit.*, Ch. VII, esp. pp. 185, 190–191.
[2] See G. Katona, L. R. Klein, J. B. Lansing and J. N. Morgan, *op. cit.*, pp. 218–221.
[3] M. Friedman, *op. cit.*, p. 90.
[4] The data were grouped into twenty-eight income classes.
[5] M. R. Fisher, 'A Reply to the Critics ', Symposium on Savings Behaviour, BULLETIN, May 1957, p. 194. Fisher was referring to the correlations between the savings-gross income ratio and gross income for 1954 and 1953–54 given by L. R. Klein and N. Liviatan on p. 156 of the same issue. The equations given here were obtained from the same data, but the correlations are slightly different because of the correction of a computing mistake and a more uniform treatment of cases where savings were not ascertained.

*One year*

1953 $$\frac{S}{Y} \times 10^2 = -4.8 + 0.0090\, Y$$

$$r = 0.37$$

1954 $$\frac{S}{Y} \times 10^2 = -4.9 + 0.0093\, Y$$

$$r = 0.47$$

*Two years*

$$\frac{S}{Y} \times 10^2 = -4.7 + 0.0090\, Y$$

$$r = 0.60$$

where $S$ = mean annual savings, and $Y$ = mean annual gross income. There is thus an increase in correlation in the longer period, of about the same size as the fall in the American data. The corresponding regression coefficient is practically unchanged, compared with an average fall of over 40 per cent in the American data. A third relevant statistic is the marginal propensity to save (at mean income) which should be lower for the two year period according to Friedman. Our estimates are 0.031 and 0.039 respectively for 1953 and 1954, and 0.035 for the two year period; thus the two year value is the same as the mean annual value. The reinterview results therefore show none of the characteristics expected by Friedman. Neither the correlation coefficient nor the marginal propensity to save change in the way he predicts. However, it is surprising that Friedman bases his assessment of the American data on the correlation rather than the regression coefficient, for data with a high degree of linear correlation but a small (income) regression coefficient would support his theory, which implies a zero coefficient. We do not find any significant decrease in the regression coefficient when the two years are taken as one period, so there is no evidence here to support Friedman's main hypothesis that the savings-permanent income ratio is a constant. On the other hand the increase in correlation can be regarded as supporting the other aspect of the hypothesis; that permanent income is a more useful variable than actual income.

A more direct test is to separate income units whose transitory component of income is small from those where it is large, and to compare the savings-income relation within these two catagories. At best, only an approximate division is possible, but it is reasonable to suppose that those with a steady or slightly increasing income have smaller transitory components than those with a varying income. We have used information on income in each of the three years 1952–4, and on expectations for future income expressed in 1954, to pick out those who had small or zero changes in income between 1952/53 and 1953/54 and who were expecting no change in income.[1] I. Friend and I. B. Kravis have used this approach and point out[2] that there should be less variation in the savings-income ratio for the constant income group if Friedman's hypothesis holds. Further, this difference should be greatest when the accounting period is shortest, since in the short period transitory elements will be largest. Friedman suggests that, for an individual, transitory elements of income tend to cancel out over three years, so although our longest accounting period is two years, we should expect to find a significant difference between the data for one and two years. The results for one year (1954) show that there is less variation in the savings ratio over the income distribution for constant income families than for the others. This is consistent with Friedman's theory, but one or two qualifications have to be borne in mind.

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[1] A 'small change' was defined as one between £24 and minus £14 for those whose gross income was less than £800 in 1953, and between £50 and minus £24 for the rest.

[2] I. Friend and I. B. Kravis, 'Consumption Patterns and Permanent Income', *American Economic Review*, May 1957, pp. 537–555.

TABLE XXIII

*One Year Savings-Income Ratios by Income Class for Income Units with Constant and Varying Incomes**

| *Gross income 1954 (£)* | *Constant income* *mean ratio of savings to net income 1954* (%) | *mean ratio of savings plus durables to net income 1954* (%) | *Varying income* *mean ratio of savings to net income 1954* (%) | *mean ratio of savings plus durables to net income 1954* (%) |
|---|---|---|---|---|
| 0—299 | −1.5 | −1.5 | −10.7 | −8.6 |
| 300—599 | −0.2 | 1.7 | −2.7 | 5.7 |
| 600—999 | 3.8 | 11.4 | 5.5 | 10.9 |
| 1,000 and over† | −1.1 | 11.9 | 11.6 | 17.7 |

* For a definition of ' constant ' income see footnote on p. 101.

† In the income class £1,000 and over, mean income for the constant group was £1,002; for the varying group it was £1,287.

TABLE XXIV

*Two Year Savings-Income Ratios by Income Class for Income Units with Constant and Varying Incomes*

| *Average gross annual income 1953–54* (£) | *Constant income* *ratio of means of savings and gross income 1953–54* (%) | *ratio of means of savings plus durables and gross income 1953–54* (%) | *Varying income* *ratio of means of savings and gross income 1953–54* (%) | *ratio of means of savings plus durables and gross income 1953–54* (%) |
|---|---|---|---|---|
| 0—299 | −5.2 | −4.7 | −5.8 | −3.2 |
| 300—599 | 2.7 | 4.9 | 0.2 | 6.2 |
| 600—999 | −2.0 | 4.5 | 3.6 | 8.9 |
| 1,000 and over* | 13.4 | 16.0 | 11.6 | 17.7 |

* In the income class £1,000 and over, mean gross income for the constant group was £1,216; for the varying group it was £1,816.

The constant income group comprises only one-eighth of a small sample, and this in itself could account for much of the difference between the two categories in Table XXIII. In addition, our definition of savings excludes expenditure on durables, whereas Friedman includes this item. A proper test of his hypothesis should therefore take account of durables, and separate figures for the ratio of savings plus durables to net income are given in Table

XXIII. These show less difference between the constant and varying income families, and the constant income group now shows a steadily increasing proportion as income increases. There are however, considerably smaller changes at the extremes of the income distribution, and the range of the ratios (13.4 per cent) is only about half that for the varying income group. In the highest income class, which is open-ended, it is possible for differences in income to be marked enough to influence savings. Mean net income was £1,002 for the constant group, and £1,287 for the varying group and this difference in average income may account for part of the differences in savings.

A similar comparison is given for the two year accounting period 1953–54 in Table XXIV. For computational convenience the ratio of means of savings and income were calculated instead of the means of the ratio of savings to income so the figures in Tables XXIII and XXIV are not directly comparable. Since there is an income control (and income is the denominator) this discrepancy should not greatly affect the results but assuming a positive correlation between income and the savings-income ratio it will mean that, other things being equal, the figures in Table XXIV will be larger in algebraic value than those in Table XXIII, with the differences most marked in the lowest income class. Further, the measure of income used for the two year period was gross income, not net income. Making allowance for the directions in which these discrepancies will bias the figures it appears that, compared with the one year period, the constant income group shows more variation over the two year period and the varying income group about the same. This result is not easy to reconcile with Friedman's theory for we should expect to find a reduction in the variation for both categories, with the reduction most marked in the varying income group. The two sets of results for the two year period are certainly more similar to each other than in the one year period, as they should be if two years are long enough to iron out a substantial amount of transitory income, but they are similar in showing a wide, not a small, range of variation. They therefore can hardly lend much support to the permanent income hypothesis. A rather negative conclusion is reached: the effects which Friedman predicts, if they are present at all, are not marked enough to show through the chance fluctuations of a small sample.

*Stationary distributions.* The Markov model can be applied to other variables than income. For instance S. J. Prais has used it in studying social mobility[1] where the transition probabilities relate the social class of father and son. Information in the Survey on contractual savings, durables expenditure, hire purchase payments, windfalls, and unusual expenses in the two periods was similarly used to estimate the stationary distributions in Table XXV. Apart from contractual savings these variables are all near to the equilibrium distribution implied by current changes.

It is when we consider contractual savings that we find a stationary

[1] S. J. Prais, 'Measuring Social Mobility', *Journal of the Royal Statistical Society*, Series A, Part I 1955, pp. 56–66.

TABLE XXV

*Stationary Distributions*

(percentages of income units)

| | *1953* | *1954* | *Stationary distribution* |
|---|---|---|---|
| **Contractual savings** (£) | | | |
| Nil | 20.6 | 17.3 | 5.6 |
| 1— 9 | 34.3 | 33.9 | 11.0 |
| 10— 24 | 28.8 | 22.0 | 9.9 |
| 25— 49 | 10.9 | 18.2 | 31.0 |
| 50— 99 | 3.6 | 5.7 | 20.9 |
| 100—199 | 1.4 | 2.4 | 11.4 |
| 200 and over | 0.4 | 0.5 | 10.1 |
| **Durables** (£) | | | |
| Nil | 79.6 | 77.2 | 77.0 |
| 25—99 | 13.5 | 16.0 | 16.2 |
| 100 and over | 6.9 | 6.8 | 6.8 |
| **Windfalls** (£) | | | |
| Nil | 86.1 | 82.5 | 81.8 |
| 1— 99 | 10.9 | 13.1 | 12.8 |
| 100—199 | 2.8 | 3.1 | 3.2 |
| 1,000 and over | 0.2 | 1.3 | 2.2 |
| **Unusual Expenses** (£) | | | |
| Nil | 83.6 | 84.1 | 83.9 |
| 1—39 | 9.8 | 11.4 | 11.5 |
| 40—99 | 6.1 | 2.1 | 2.3 |
| 100 and over | 0.5 | 2.4 | 2.3 |
| **Hire Purchase** | | | |
| No hire purchase started during year | 77.0 | 78.9 | 79.6 |
| Hire purchase started during year | 23.0 | 21.1 | 20.4 |

distribution markedly different from the current distributions. A comparison between the 1953 and 1954 distributions reveals a decided upward tendency in the average amount of contractual savings, and this is reflected in the stationary distribution, which shows less than 6 per cent of income units with no contractual savings, and 41 per cent with £50 and over. Part of this change may be due to misreporting in one or other of the two years. A sample of the questionnaires was inspected to check on this point, and it was found that there was a good deal of variation in the reporting of life assurance premiums, and, less often, of superannuation payments. In a few cases where incomplete details of mortgages were given, the estimates of principal repayments varied. These errors were not consistently in one direction and they may be expected largely to cancel each other out, so that the conclusion that contractual savings are increasing, which is anyway borne out by other sources, is not invalidated. It is noteworthy, however, that identical people sometimes answer identical questions quite differently in two consecutive years, especially as those on superannuation and life assurance were some of the simplest in the questionnaire. It is obviously true that some people will have altered their assurance policies during the year, but it seems unlikely that such differing reports as were received reflected the true situation. The total effect of these discrepancies should not be over-emphasised, however. The actual amount of money involved in most instances was small, and as stated above the errors tended to cancel out.

This check throws light on the problem of misreporting, but the errors which have been found are not great enough, or of the right kind to account for the upward trend in contractual savings shown in Table XXV. The peak of the distribution has moved from the range £1 to £9 in the current distributions to the range £25 to £49 in the stationary distribution and there is a very large increase in the percentage of income units with contractual savings of £100 and over a year. The stationary distribution must be interpreted with care as has been pointed out above. It is not a prediction, but it shows that the changes in contractual savings are in a strongly upward direction and are such as would lead, if continued, to a situation with nearly every income unit having contractual savings in some form, and to three-quarters (compared with a quarter at present) having contractual savings of at least £25 and therefore probably belonging to a pension scheme or making repayments on a mortgage. There have been wide extensions in both pension schemes and life assurance in recent years, and it is therefore quite reasonable that the shifts in contractual savings that occurred between 1953 and 1954 were of the nature indicated by the stationary distribution.

# A 'HUMAN NEEDS' DIET—AUTUMN 1957

### *By* T. Schulz

This survey of the cost of a ' human needs ' diet for a family consisting of husband, wife, and three children of school age[1] was undertaken during the last week of September and the first two weeks of October in London, Oxford, Reading, Newbury, Birmingham, Banbury and Abingdon. The prices were collected from market stalls and well kept shops—multiple and individually owned—that specialized in catering for people with small purses.

Before the war it was possible to map out a standard ' human needs ' dietary, valid for long periods, and obtain a realistic index by simply assessing at intervals the changes in its total cost. This method is no longer applicable if one looks for a reasonable estimate of the actual cost of an adequate diet at a given date. For nowadays diets even in the lower income groups tend to be much more varied and variable than they were in pre-war days. One reason for this is that the retail prices of certain foods are modified by subsidies, a fact which can have a considerable effect on the relative price structure of foods in general and, through this, on the dietary patterns. Furthermore, the average standard of living of the manual worker and his family has risen substantially since before the war. A 'human needs' standard of living is the reflex of the established average standard of living when this has been pruned of its obvious frills; but what was a luxury when working-class incomes were low may become a quasi-necessity after the level of these incomes has gone up. This happens in the case of non-food items as well as of foodstuffs. But while expenditure on many non-food items is fairly inelastic, at least in the short run, expenditure on food, if normally not ungenerous, may be highly elastic when the income suddenly falls steeply. Yet too sharp a decline from an accustomed level of food expenditure may entail malnutrition, not perhaps because the purchasing power falls short of what is required for a nutritionally adequate minimum diet but because of a distorted dietary pattern, in which nutrional values are sacrificed in favour of culinary values.

The ' human needs ' dietaries presented in the bi-annual surveys of this series are compiled after a detailed study has been made of the supply of foods and the prevailing price structure. The dietaries indicate how a stable nutritional intake can be maintained at a low cost from one period to another, having regard to the conditions of the market at a given time. These conditions however are not considered in relation to the nutritional aspect of the dietaries from a purely objective angle. The dietaries indeed assume that a food which has become relatively dear will to some extent at least be replaced by a cheaper equivalent food, if such food is available and acceptable from a culinary point of view, and *vice versa*; but they also make some allowance for the subjective impact of changes in relative prices on the average housewife's pattern of purchases. Thus a food that has declined relatively in price may be considered ' cheap ' by a housewife because it will help her to enhance the culinary appeal of other inexpensive ingredients of a meal, even though in fact the food itself may still be a relatively dear source of nutrients.

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[1] Average age per child about eight years.

It will be seen that the dietary for the autumn of 1957 (Table I) shows a rise in the total weekly cost from 69s. 9d. in the spring of 1957 to 70s. 5½d. This small increase could easily have been avoided by leaving unchanged the quantity of fish and the quantities and types of bacon given in the spring dietary. However, bacon which during the summer of 1957 had become rather dear, had considerably declined in price at the time of our autumn survey, and fairly lean bacon could be obtained at 2s. 6d. a lb. This type of bacon offered a valuable culinary addition to the diet of a family that could only afford to buy small quantities of meat. We therefore included in the autumn dietary 1 lb. of this bacon in lieu of 1 lb. of rather fat boiling bacon and ½ lb. of cheap rashers, making good the calorific deficiency by increases in the allowances of herrings and also of fats.

TABLE I

*Weekly 'Human Needs' Diet for a Family of 5 Persons—Autumn 1957*

|  | Quantity | Average Price Per Unit[1] | *Changes since Spring 1957* |  |
|---|---|---|---|---|
|  |  |  | *Quantity* | *Outlay* |
|  |  | s. d. |  | *s. d.* |
| Meat | 4 ℔ | 2 4 | ... | ... |
| Bacon | 1 ℔ | 2 6 | — *8 oz.* | — *2* |
| Herrings | 1 ℔ 8 oz. | 1 6 | + *1 lb.* | + *1 0* |
| Eggs | 12 eggs | 2½ | ... | + *6* |
| Cheese | 2 ℔ | 1 10 | + *4 oz.* | — *8½* |
| Milk, fresh | 16 pt. | 7½ | ... | ... |
| *do.* condensed skimmed | 2 tins[2] | 10½ | ... | ... |
| School milk | 5 pt. | free | ... | ... |
| Margarine | 2 ℔ 4 oz. | 1 6 | ... | — *9* |
| Other Fats | 1 ℔ | 1 0[3] | + *4 oz.* | + *0½* |
| Potatoes | 21 ℔ | 3 | ... | + *1 9* |
| Onions | ℔ 8 oz. | 6 | ... | — *7½* |
| Other Root Vegetables[4] | 7 ℔ | 5 | ... | + *7* |
| Greens | 3 ℔ 8 oz. | 4 | ... | — *3½* |
| Dried Legumes[5] | 2 ℔ 8 oz. | 1 0 | ... | + *2½* |
| Bread | 19 ℔ 4 oz. | 11½ | ... | — *5½* |
| Flour | 3 ℔ | 1 7 | ... | ... |
| Rolled Oats | 2 ℔ 8 oz. | 10 | ... | ... |
| Other Cereals[6] | 1 ℔ 2 oz. | 10¾ | ... | ... |
| Sugar | 3 ℔ | 7 | ... | — *10½* |
| Tea | 8 oz. | 4 4 | ... | ... |
| Other Foods[7] and Condiments | ... | 3 7½ | ... | ... |
| **Total Cost** |  | **70 5½** |  | + *8½* |

[1] The price units are: eggs, one egg; fresh milk, pint; condensed milk, tin; bread, 1½ ℔ loaf; flour, 3 ℔ bag; 'other foods and condiments', total outlay.
[2] Equivalent to approximately 3½ pt. of skimmed milk and 11 oz. of sugar.
[3] Average price for 4 oz. of lard and 12 oz. of raw suet.
[4] Carrots, swedes, turnips.
[5] Lentils, peas, haricot beans.
[6] Small grain rice, macaroni, semolina, barley.
[7] Including cocoa, cooking apples or jam, syrup, etc.

Eggs of medium size have risen in price from 2d. to 2¼d. and, more often, 2½d., and potatoes and other root vegetables also were dearer at the time of the autumn survey than they had been in the spring. Greens on the other hand tended to be a little cheaper. Bread, dried legumes, and margarine had not generally changed in price, but in the autumn of 1957 inexpensive margarine at from 1s. 3d. to 1s. 6d. could be bought in all the towns visited, and the standard 1¾ lb. loaf of bread could be obtained everywhere—although not from all bakers—at 11½d. Dried legumes were in some places a little dearer than they had been in the spring. Hence the average prices given in the autumn dietary in Table I for bread and margarine are lower than the prices in the spring dietary, while the average price given for dried legumes is slightly higher than the price in spring.

The average prices shown in Table I may be compared with certain minimum prices encountered not infrequently in the course of this autumn survey. Mention has already been made of the minimum prices of medium sized eggs and of margarine. Cheap imported stewing beef could be bought at from 8d. to 1s. a lb.; pig's head at from 6d. to 10d. a lb.; imported stewing lamb at from 1s. to 1s. 2d.; beef fat for rendering down, at from 8d. to 10d.; cheddar type cheese, at 1s. 8d.; lentils, peas, and beans, at 10d.; small grain rice and semolina, at 9d.; pearl barley at 7½d.; tea, at 4s. Potatoes were offered at 1s. 2d. for 5 lb and granulated sugar at 1s. 1d. for 2 lb. Some of these low priced foods were available in all the towns. The dietary suggested in Table I was thus capable of being considerably modified within the limit set by its total cost, and without reducing its total content of essential nutrients; for the individual housewife who wished to buy certain more expensive items could counterbalance the additional outlay thus incurred by effecting in some other direction additional economies.

During the war it became imperative to feed the people as economically as possible without undermining either their health or their morale. Thus rationing was accompanied by an intensive propaganda destined to make everyone conscious of the nutrional values of essential foods. Much of this war-time education has by now worn off and foods are again chosen more or less in accordance with 'likes' and 'dislikes', which is not altogether a bad thing when people have the means of buying a varied mixed diet and the physical capacity of enjoying it. However, the propaganda in favour of milk consumption continues and is being sustained effectively by the supply of free milk to the children at school and of cheap milk to children under five years of age and expectant mothers. For milk—and cheese—is not only the cheapest almost complete food supplying indispensable proteins but also the most important natural source of assimilable calcium, and because of this is essential for the development of healthy bones and teeth. The consumption of milk has risen considerably since before the war; in the average post-war diet of families with children milk plays a far more important role than it did in the pre-war diet of such families, and meat and meat products play a less important one. Account is taken of this change in consumption habits in our ‘ human needs ’ dietaries, which in this respect differ fundamentally from the ‘ human needs ’ dietary suggested by the late Mr. S. Rowntree in 1936 for a family with three children.

The difference between this pre-war dietary and the dietary shown in Table I can perhaps most easily be appreciated by comparing the amounts of foodstuffs available in each instance per day to a family of five persons. This comparison is made in Table II. For the data in Table II, all condensed skimmed milk has been evaluated in terms of fresh skimmed milk and sugar, and all bread in terms of flour. The sugar content of treacle, jam, and dried fruit in the 1936 dietary[1] has been computed, and the difference between the outlay that would have been required for the purchase of this amount of sugar and the actual outlay allowed by Mr. Rowntree on these foods included in the figure of outlay on unspecified vegetables, condiments, etc., in Table II. On the other hand, from the total outlay assumed in Mr. Rowntree's dietary on unspecified vegetables and fruit, the cost of 1 lb. of potatoes and 2 oz. of dried legumes per day (items 8 b and 11 b in Table II) have been deducted so as to allow for the purchase of these specified additions and thus bring the figures of established calorific and protein intake from the 1935 diet in line with those relating to the 1957 dietary.

TABLE II

*Daily ‘ Human Needs ’ Diets for Family of 5 Persons*

| | Rowntree 1936 | Autumn 1956 |
|---|---|---|
| 1 Meat, Bacon, etc. ... ... ... ... | 21.7 oz. | 11.4 oz. |
| 2 Fish ... ... ... ... ... ... | 5.7 oz. | 3.4 oz. |
| 3 Eggs ... ... ... ... ... ... | 0.14 egg | 1.71 egg |
| 4 Cheese ... ... ... ... ... | 2.3 oz. | 4.6 oz. |
| 5 Milk, full cream ... ... ... ... | none | 3.00 pt.[1] |
| 6 *do.* skimmed ... ... ... ... ... | 2.00 pt. | 0.54 pt. |
| 7 Fats (as bought) ... ... ... ... | 6.3 oz. | 7.4 oz. |
| 8*a* Legumes ... ... ... ... ... | 2.9 oz. | 5.7 oz. |
| 9 Flour[2] and Cereals ... ... ... ... | 47.9 oz. | 45.9 oz. |
| 10*a* Sugar (as bought) ... ... ... ... | 4.6 oz. | 6.9 oz. |
| 10*b* *do.* (in foods) ... ... ... ... | 9.7 oz.[3] | 1.6 oz.[4] |
| 11*a* Potatoes ... ... ... ... ... | 32.0 oz. | 48.0 oz. |
| 12 Tea ... ... ... ... ... ... | 1.1 oz. | 1.1 oz. |
| 8*b* Legumes ... ... ... ... ... | 2.0 oz. | ... |
| 11*b* Potatoes ... ... ... ... ... | 16.0 oz. | ... |
| *Cost of Foods* ... ... ... ... ... | *2s. 9d.* | *8s. 11d.* |
| *Vegetables, Condiments, etc.* ... ... ... | *4d.* | *1s. 1¾d.* |
| *Total cost p.d.* ... ... ... ... ... | *3s. 1d.* | *10s. 0¾d.* |

[1] Including 0.71 pt. received by 3 children free at school.
[2] All bread converted into its flour equivalent.
[3] In condensed milk, treacle, jam, and dried fruit.
[4] In condensed milk.

The total daily outlay required for Mr. Rowntree's ‘ human needs ’ diet in 1936, was 3s. 1d. The ‘ human needs ’ diet for the autumn of 1957, shown in Table I, cost 7s. more, *i.e.*, it cost about 3.26 times as much as the diet for 1936. Nutritionally the 1957 diet is superior to the 1936 diet because it includes a relatively large amount of fresh full cream milk, of which none is allowed in the 1939 dietary; for in 1936 full cream milk ranked as a luxury. However, the butter fat of the milk not only provides calories but also vitamins, which especially benefit the children. Calories derived from the milk fat in the 1957 diet are in the 1936 diet replaced by calories derived from sugar—a pure carbohydrate food without other nutritional content. Vitamins lost through the absence of milk fat could to some extent be obtained from liver and judiciously chosen vegetables; but their supply would at best be more uncertain and, moreover, would to a larger extent be swallowed up in the shares of the adults. Also, since in a family with a low income the largest portion of the meat usually is allotted to the bread winner, the amount of essential proteins obtained by the children of a family on the 1936 diet might in fact be disproportionately small.

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[1] Per week: 1 lb of treacle, 1 lb. of jam, and ½ lb. of dried dates.

If the amount of milk in the 1957 diet is left unchanged but the full cream milk to be purchased replaced by 16 pints equivalent of skimmed (condensed) milk—which in order to leave unchanged the calorific intake from the diet, would necessitate the reduction of the weekly purchase of sugar from 3 lb. to 1 lb.—the daily cost of this diet is reduced from 10s. 0¾d. to about 9s. 6d., which is about 3.08 times the cost in 1936 of Mr. Rowntree's ' human needs ' diet. The dietaries for 1936 and 1957 are not strictly comparable. Both, however, fit into the normal consumption patterns of their respective period and are backed in their nutrional aspect by the scientific information available at the time of their compilation. Hence it is not without interest to find that the ' rise ' in cost—from 100 in 1936 to 308 in the autumn of 1957—comes fairly close to the rise shown by the retail index of food prices,[1] from an average of 100 in 1936 to about 300 by mid-September 1957.

The relative nutronal values of calories and protein as provided by the diets for 1936 and the autumn of 1957, are set out in Table III. The total calorific contents as well as the total contents of proteins of the two diets can be taken as identical.[2] It therefore will be observed that both these diets also provide identical amounts of animal protein, *viz*[3]., about 42 per cent of their total content of protein (including in this total the protein obtained from unspecified vegetables and small quantities of other unspecified foods). But if we only consider the figures of animal protein—equating in each instance this group of proteins with 100—the similarity ceases. For while in 1936 as much as 53 per cent of the animal protein was derived from meat foods and only about 35½ per cent from milk and cheese, the autumn dietary for

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[1] *Ministry of Labour Gazette* and *London and Cambridge Economic Bulletin.*

[2] It may not be quite superfluous to repeat here once again that foods in general are not standardised sources of nutrients and that therefore all calculations of nutritional values are, in practice, only approximations within inevitably sometimes fairly wide limits.

[3] The expressions ' animal protein ' and ' vegetable protein ' are here employed for the sake of simplicity. Strictly speaking, both expressions should be in the plural, since in fact both represent groups of proteins. These groups moreover have no clear dividing line between them.

TABLE III

*Relative Nutrituional Values of Foods in 'Human Needs' Diets*

| | Calories | | Protein | |
|---|---|---|---|---|
| | 1936 | 1957 | 1936 | 1957 |
| | % | % | % | % |
| Meat, Bacon, etc. (1)[1] ... ... | 14.2 | 7.9 | 22.5 | 11.5 |
| Fish (2) ... ... ... ... | 1.5 | 0.9 | 4.7 | 2.8 |
| Eggs (3) ... ... ... ... | 0.1 | 1.0 | 0.2 | 2.1 |
| Cheese and Milk (4, 5, 6) ... | 6.2 | 14.6 | 15.0 | 26.0 |
| Fats (7) ... ... ... ... | 12.3 | 14.9 | — | — |
| Flour and Cereals (9) ... ... | 41.9 | 41.1 | 43.0 | 41.3 |
| Sugar (10*a* & *b*) ... ... ... | 13.2 | 8.1 | — | — |
| Legumes and Potatoes (8*a*, 8*b*, 11*a*, 11*b*) ... ... ... | 10.6 | 11.5 | 14.6 | 16.3 |
| Total ... ... ... ... | 100.0[2] | 100.0[2] | 100.0[2] | 100.0[2] |

[1] The figures in brackets indicate the corresponding food groups in Table II.

[2] Excluding fresh vegetables other than potatoes, fruit, and ¼ ℔ cocoa. These foods might increase the calorific intake by about 2 per cent and the intake of protein by from 2 to 2½ per cent.

1957 provided only 27 per cent of it from meat and 61½ per cent from milk and cheese. The role played by fish and eggs as sources of animal protein is relatively small in both diets, and in actual post-war diets could be highly variable, dependent on the general price structure. The prices of eggs in particular are now liable to very considerable fluctuations, and a dozen eggs per week are by no means a necessity for a family with three children of school age. Mr. Rowntree's dietary for 1936 only allowed for such a family one egg per week. The consumption of both herrings and eggs can easily be adjusted, either upwards or downwards, for nutritional as well as culinary values, by appropriate modifications in the allowances of other animal protein foods, and inexpensive stewing meat and cheese could provide acceptable substitutes.

Another important difference between the 1936 and the 1957 dietaries will be noticed with respect to sugar. In Table II we saw that the dietary for 1957 allowed for the purchase of 50 per cent more sugar than the dietary for 1936, in which latter nevertheless the *total* ascertainable allowance of sugar surpassed that in the 1957 dietary by nearly 70 per cent. This reflects the relatively large amounts of sugar contained in the quantities of condensed skimmed milk, treacle, jam, and dried fruit, provided for in the 1936 dietary. The condensed milk in this dietary would yield about 6 oz. of sugar per day, and the treacle, jam, and dried fruit together about 3.7 oz. The daily consumption of sugar in accordance with this dietary would therefore amount to nearly 3 oz. per head, representing 13.2 per cent of the average calorific intake of the family. In actual fact this proportion would probably be lower for the adults and consequently even higher for the children, and hence by post-war standards unadmissably high, because it would be attained to the detriment of the consumption of nutrionally more important foods.